F Series UPS （10~160KVA）

User’s Manual

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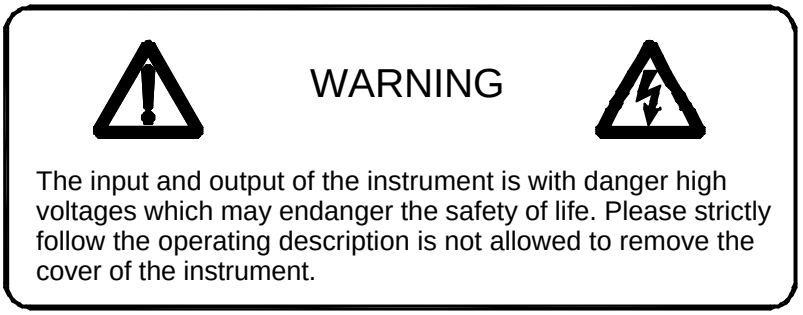
？ Note？

Please carefully read the user's manual before operation for the sake of understanding correct operation of the instrument. Please keep the manual handy for future reference.


WARNING
The input and output of the instrument is with danger high voltages which may endanger the safety of life. Please strictly follow the operating description is not allowed to remove the cover of the instrument.

1. Please keep the instrument connect the ground before connecting instrument.
2. The input & output voltage of the instrument is dangerous which will endanger the safety of life.
3. Please do not open the cover of the instrument by yourself in view of danger of shock.
4. Please turn off the mains input switch and the battery breaker for any urgency.
5. There are many kinds of power sources for the instrument, the line bank or the socket may still have voltage if only the main power is disconnected.
6. Please remove the cable between the battery & instrument before repairing. It's necessary to wait for another 5 minutes for discharging, because of the danger of shock.
7. The wires should be fastened to the terminals. It is prohibited to short the anode and cathode of battery. It's prohibited to touch any two of wire connectors or bare end of connecting wires. Otherwise, it may lead to damage of battery or personal injury.
8. Please keep the battery and battery group away from the fire and any instrument that may cause spark to prevent the danger and damage.
9. Please do not open or shatter the battery, the overflow electrolyte is with causticity that may be harmful to life.
10. Please contact the professional personnel of the local dealer or the special maintenance station for any trouble-shooting. Random disposal of the trouble is not allowed.
11. This is an A-grade product with electromagnetic compatibility.
12. This equipment must be installed and serviced by qualified personnel.
13. Before you replace the battery of different brand and different type, make sure the charging voltage is matching with UPS charging voltage due to the different required charging voltage of different battery, If any doubt, please consult with the manufacturer. Any changes of the system configuration, structure and composition will influence the performance of UPS, please consult with the manufacturer in prior before doing any changes.

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1. System Overview

1.1 Brief Introduction

This series is true sine wave on-line UPS with high performance, adopting advanced technique to protect PC, communication device, electric machine, medical equipment etc. from disturbing or losing data from power failure. This series product can be use to resolve all kinds of power problems such as power interruption, voltage fault, electronic noise, peak, instantaneous voltage fall, lighting, instantaneous voltage fluctuation, frequency fluctuation etc.

1.2 Configuration

1.2.1 Basic Configuration

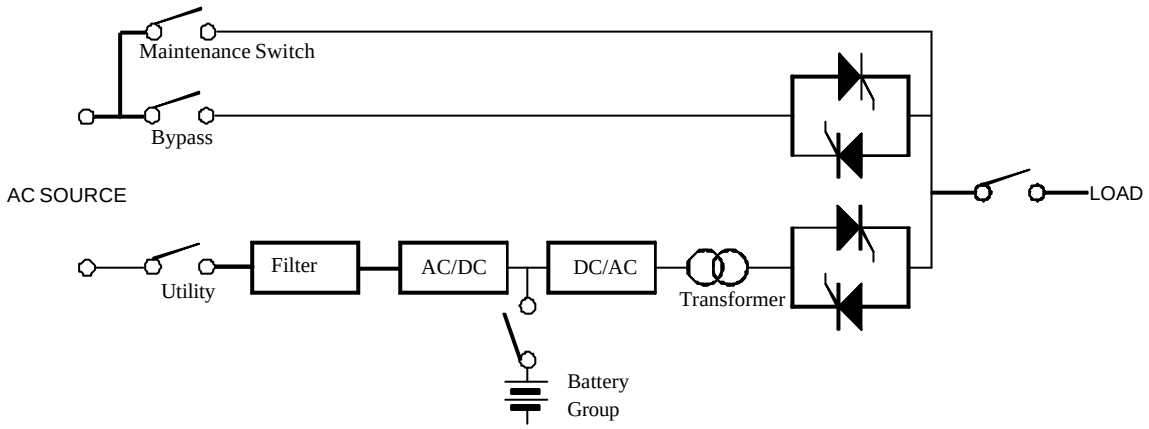


Figure 1-1 UPS Basic Configuration

This UPS includes: Input Breaker, Input Filter & Protection Circuit, Rectifier, Inverter, Static Switch, Bypass Breaker, Isolation Transformer, Output Filter & Battery group etc. as showed in Figure 1-1. When the utility is normal, AC power goes through filter and rectifier then change to DC power to inverter for charging the battery, which can be supply pure power to load at no transfer time.

This system includes four operation modes: utility mode, battery mode, bypass mode and maintenance bypass mode, showed as following:

1.2.2 Utility Mode

As showed in Figure 1-2, at the status of the utility normal, the rectifier changes the AC power to DC power to inverter and charging the battery. Through the process of AC power changed to DC power, the inverter can supply more reliability and pure power to load, as the rectifier can dispel the problems of the portent, noise, unstable frequency and so on.

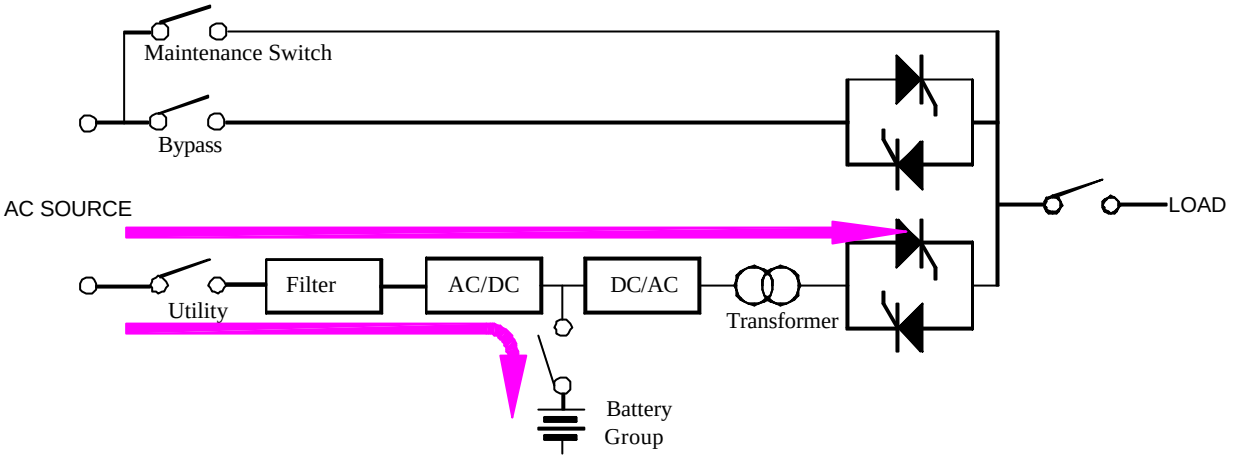


Figure 1-2 Utility Mode

1.2.3 Battery Mode

As showed in Figure 1-3, when the utility is abnormity, the battery connected to DC BUS will supply power to inverter, to protecting load from AC power interrupting.

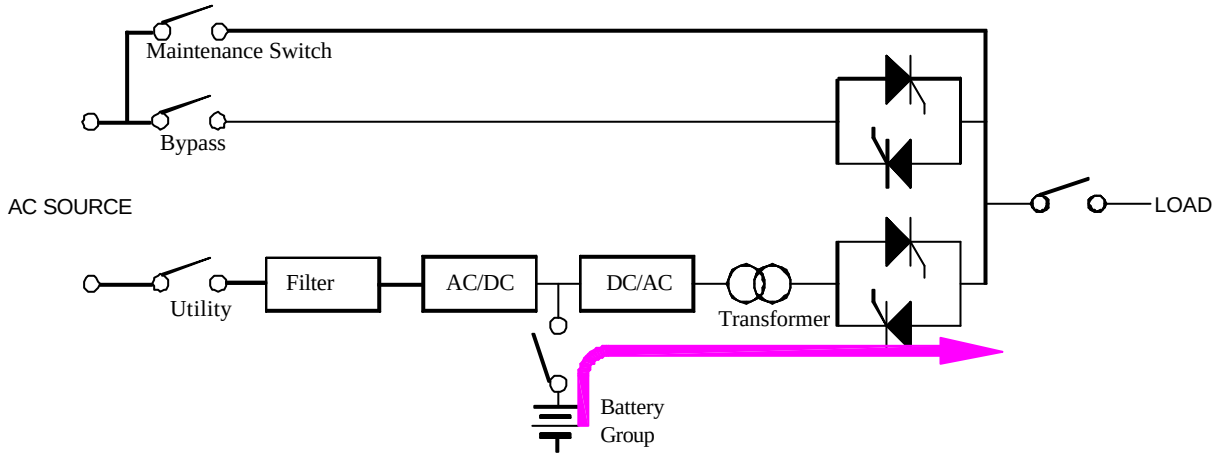


Figure 1-3 Battery Mode

1.2.4 Bypass Mode

As showed in Figure 1-4, when the inverter is failure (such as over-temperature, short current, output voltage abnormity, overload and so on), the inverter should shut off automatically. If the utility is normal at this moment, the switch will switch to bypass power to supply power to load.

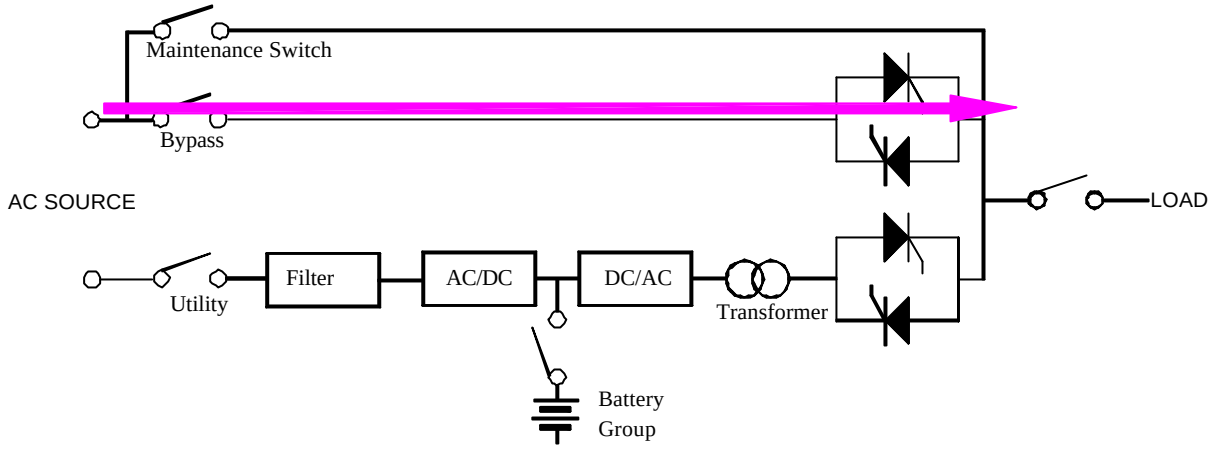


Figure 1-4 Bypass Mode

1.2.5 Maintenance Bypass Mode

As showed in Figure 1-5, when you are maintaining or changing the battery, and the power must not be interrupted, you can shut off the inverter, and turn on the maintenance breaker, then turn off the rectifier and bypass breaker. At this mode, AC power goes through maintenance breaker to supply power to load. And at this time, there may be no any electricity in the UPS inside except the output transformer, and the maintenance personnel can work without any angst.

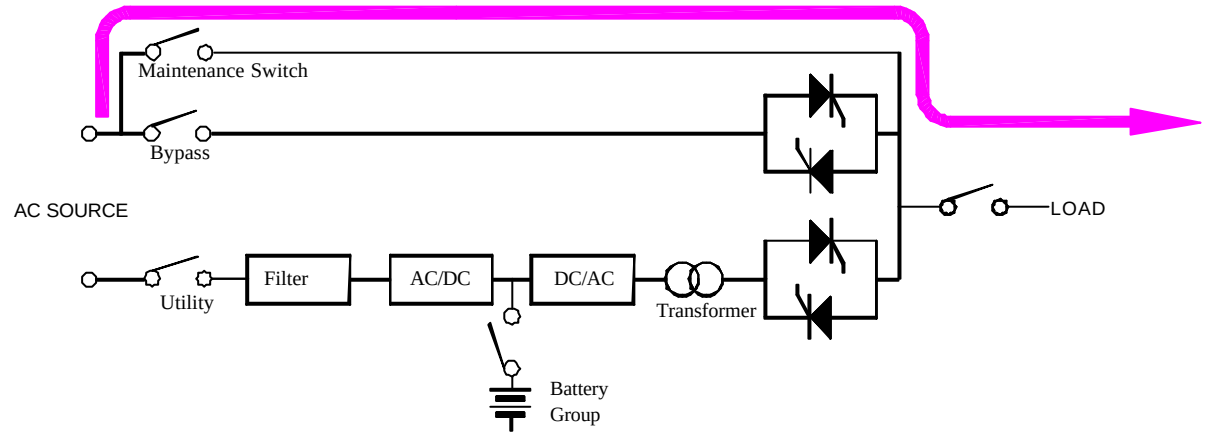


Figure 1-5 Maintenance Bypass Mode

1.3 System Features and Advantages

True double conversion on line UPS

Complete isolation at input/output by transformer, and adopting high efficiency IGBT power module for a real settlement on lighting, voltage between neutral and ground, all kinds of pulse and disturbance in power network supply a safe operating environment for equipment.

Digital DSP Control Technology

The invert control, synchronous phase, input rectifying control, and logic control etc. are all controlled by DSP, as the control is with high precision, high speed, and high whole system performance.

Full function LCD display interface

Large LCD display panel displays the operation status and parameters with rich display content; and can record the history parameter for maintenance.

Compatible the load with unbalance 3 phases

Adopting 3 absolutely independent full bridge inverter, the separate control circuit design, so 3 phase output allow 100% unbalance load. There is not inter affect between each phase, increasing the inverter reliability.

Flexible network supervising

This series can realize the intellectual supervising UPS and PC by RS232, SNMP and independent remote monitor. It is convenient for user power management including 1 to 1 single monitor and 1 to N muti-monitor.

Manual bypass maintenance design

Design bypass maintenance channel to assure the maintenance on machine without load power break.

Reliable EMC features

Passed the authority institution and company test on EMC, including conducting disturbance, radioactive disturbance, conducting anti-disturbance, radioactive anti-disturbance, power fault, mass impulsion, static discharging, surge etc. The predominant EMC features can be applied to high frequency communication,

broadcasting audio and video system.

- **Wide voltage input range**

Strong adaptability for power network can be applied to different voltage range.

- **Owns DC startup function**

Allow start up by battery without utility power to facility user operation.

- **Intellectual battery charging and test**

Patented intellectual battery management technique and professional managing design on battery charging and discharging improve the battery reliability and validity. The automatic test on battery also reaches above target.

- **Redundant design for key circuit**

System working power source adopt redundant backup design to improve the system running reliability.

- **Intellectual Fans control**

Fans can adjust rotate speed in accordance with the loading status to prolong fans life and lower noise.

1.4 Rectifier system

The main function of rectifier is to transform AC utility into DC power for inverter. Then the inverter transforms the DC power into AC power for load, at the same time the rectifier charges battery group on line.

1.5 Inverter system

Inverter: It consists of IGBT module, inductance, capacitor, filter board, control circuit and protection circuit. It can transform DC power from DC BUS into AC power for load. Adopting 3 phase inverter independent control technology, the machine compatible 3 phase 100% unbalance load through it takes more cost. The high capacity module with high performance and well abstraction of heat decreases the fault rate for UPS inverter.

1.6 Static Switch System

Static switch takes high reliability SCR module. It can switch the load power supply from bypass to inverter or from inverter to bypass in a short time; It also can switch invert output to bypass output at inverter fault or other fault instantly; The System never allows bypass output but to shut down bypass input SCR to prevent the shatter on user device from the wrong utility supply at abnormal bypass voltage, frequency and wrong phase order.

1.7 Maintenance Bypass Switch System

For convenient maintaining, UPS set a internal maintenance bypass breaker. It will be switch off normally, but will be opened only for hot maintenance to keep user load running without break. To assure maintaining personnel safety, it is necessary to switch off all UPS internal power during the maintaining. If the maintenance breaker is opened at normal status, inerter will stop and load power will be switched into bypass supplying.

1.8 the Shape and the Display Panel

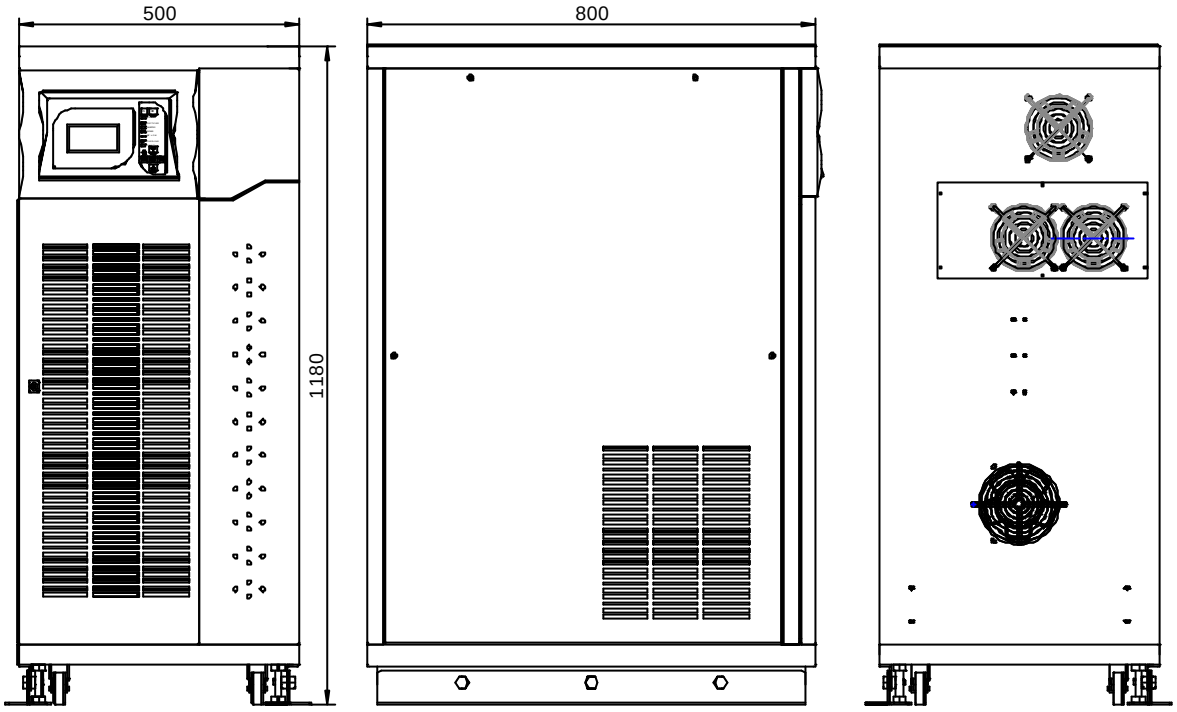


Figure 1-6 External dimension of 10~30KVA

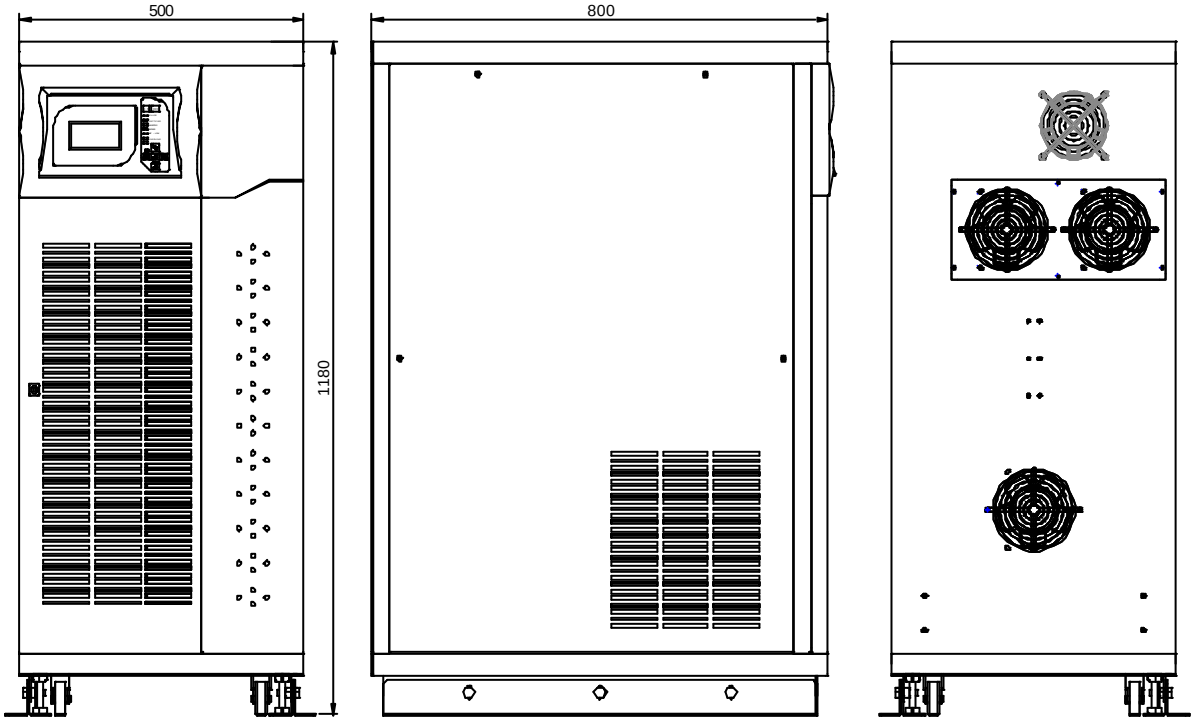


Figure 1-7 External dimension of 40~60KVA

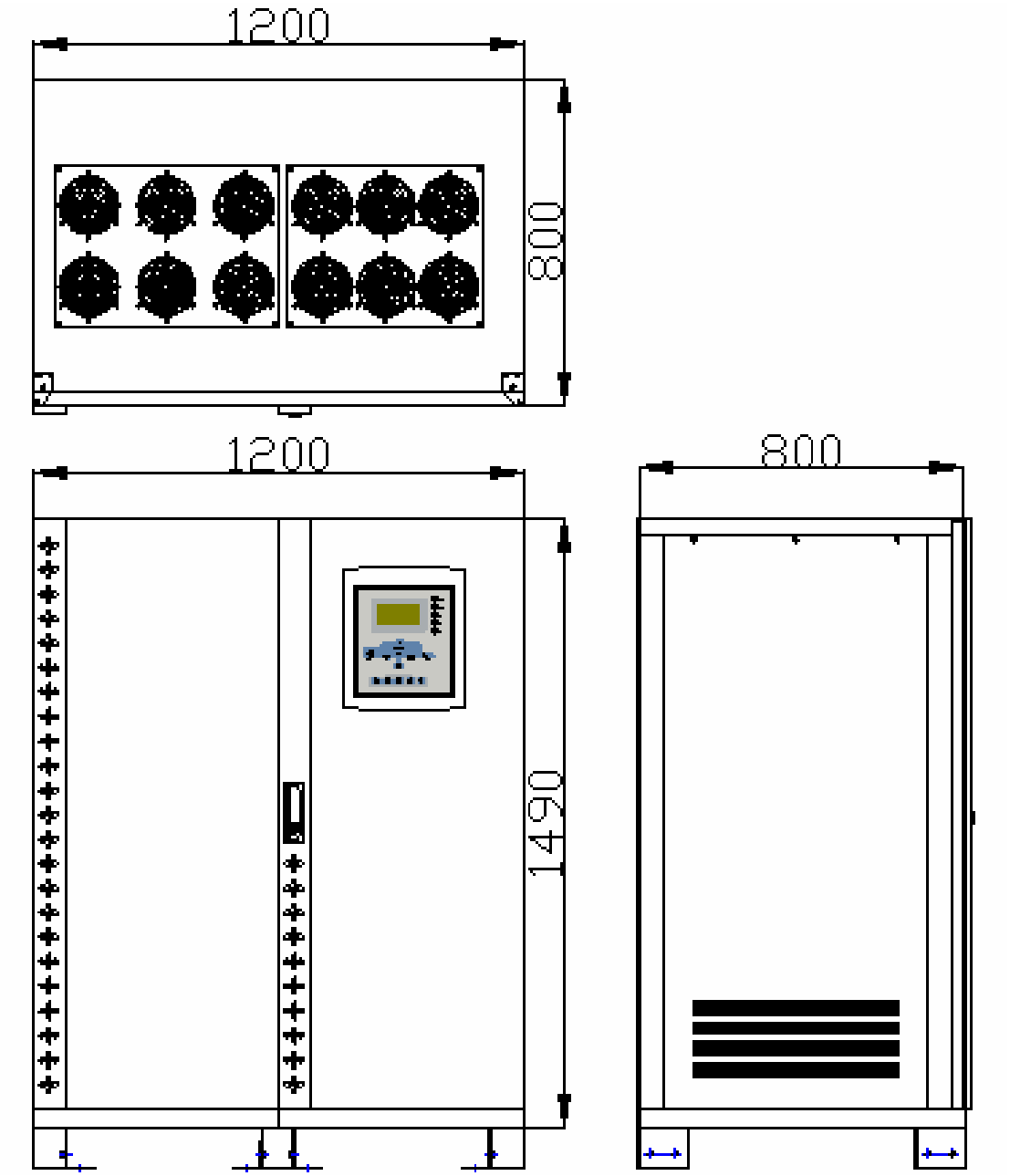


Figure 1-8 External dimension of 80~160KVA

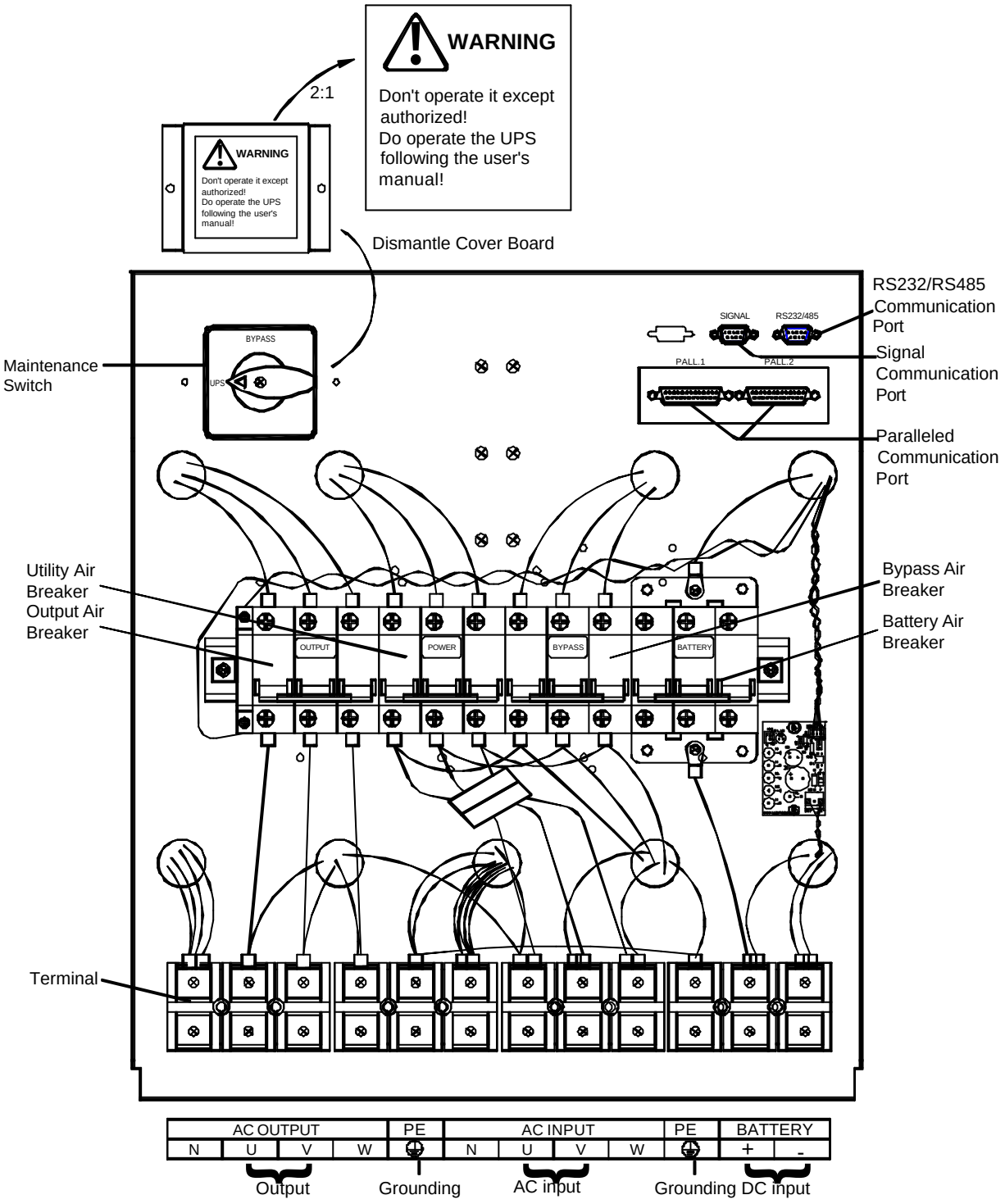


Figure 1-9 Terminal and breaker of three-phase series(10~30KVA)

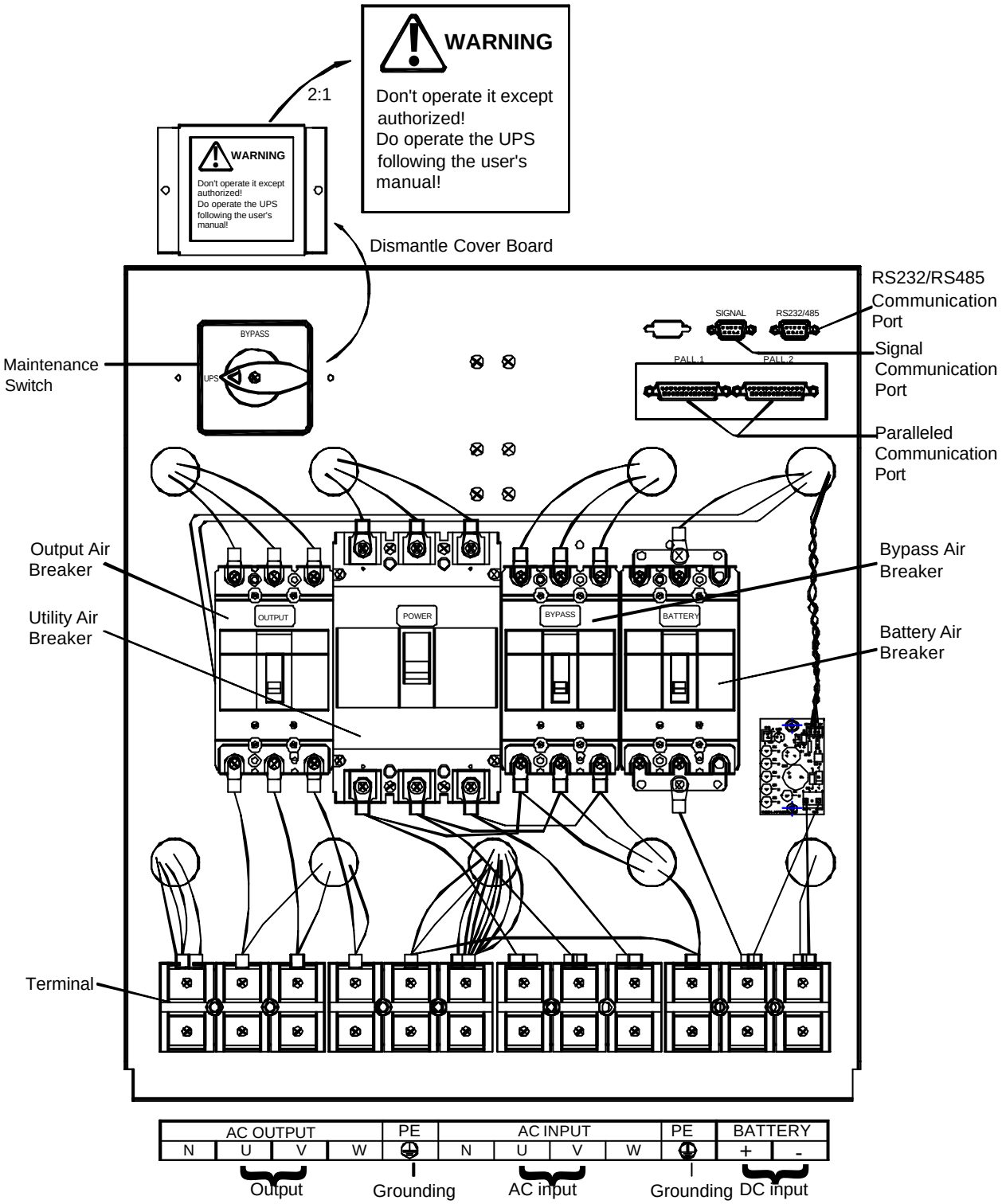


Figure 1-10 Terminal and breaker of three-phase series(40~60KVA)

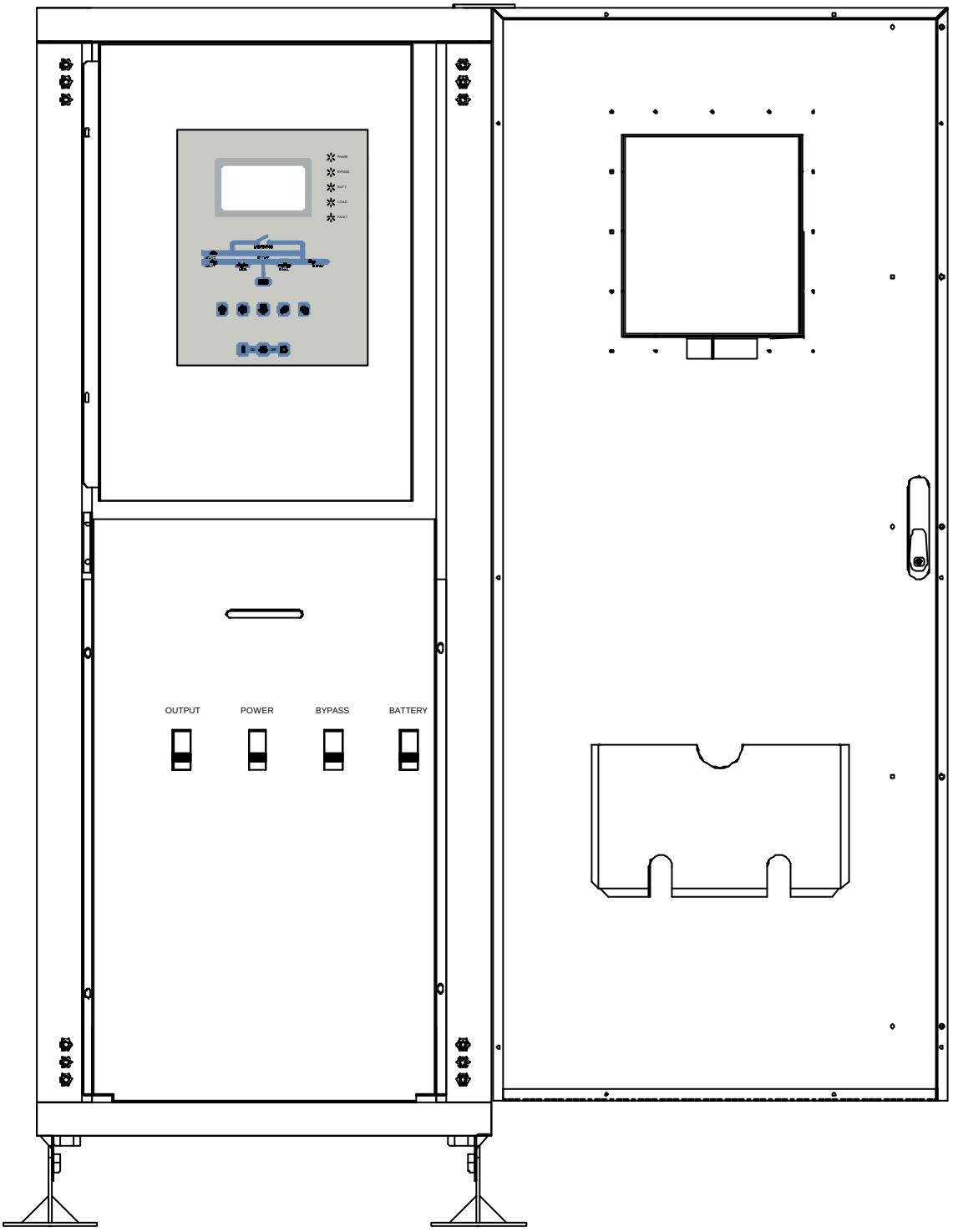


Figure 1-11 the inside of the door of 60KVA products of this series

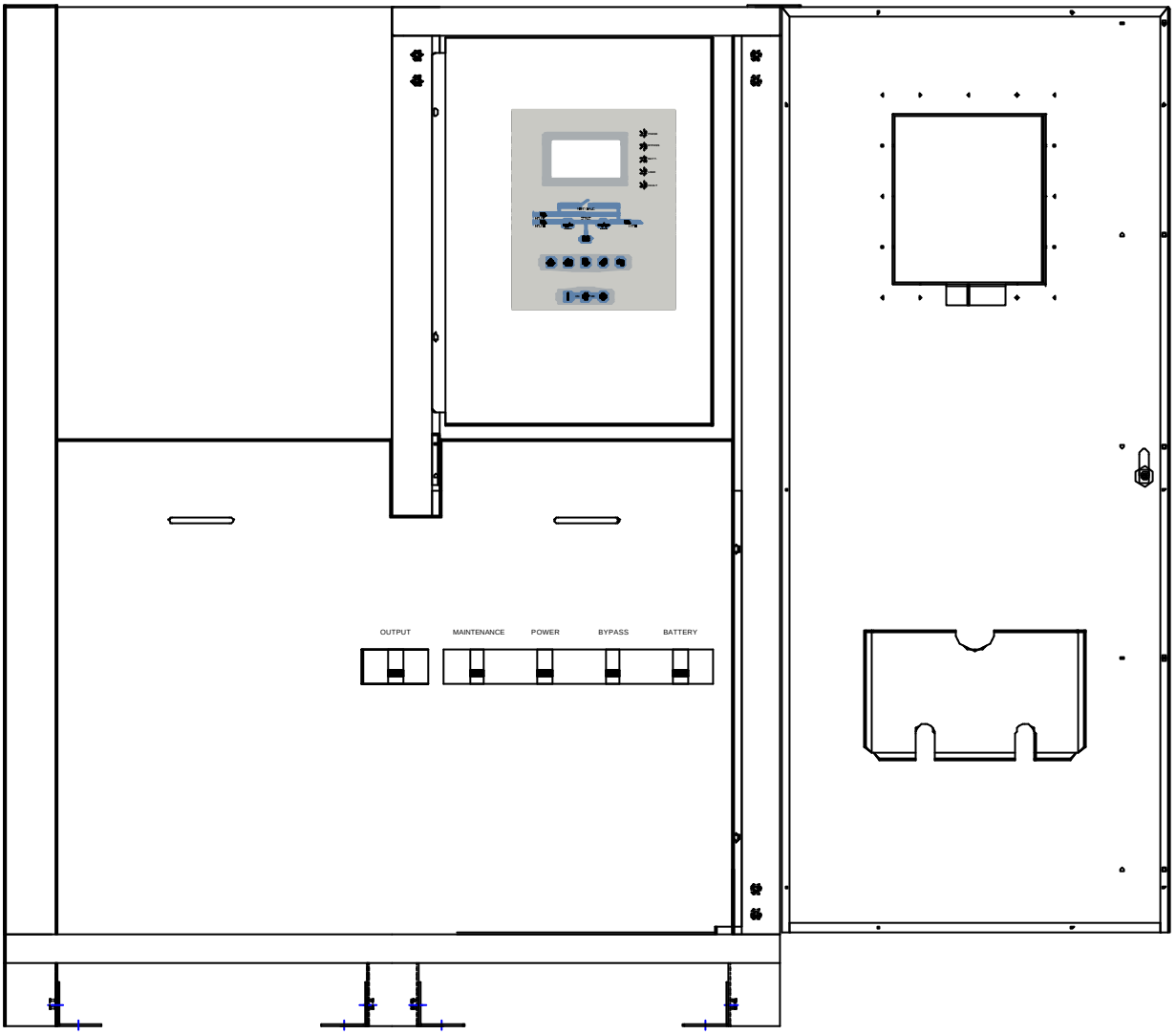


Figure 1-12 the inside of the door of 80~160KVA products of this series

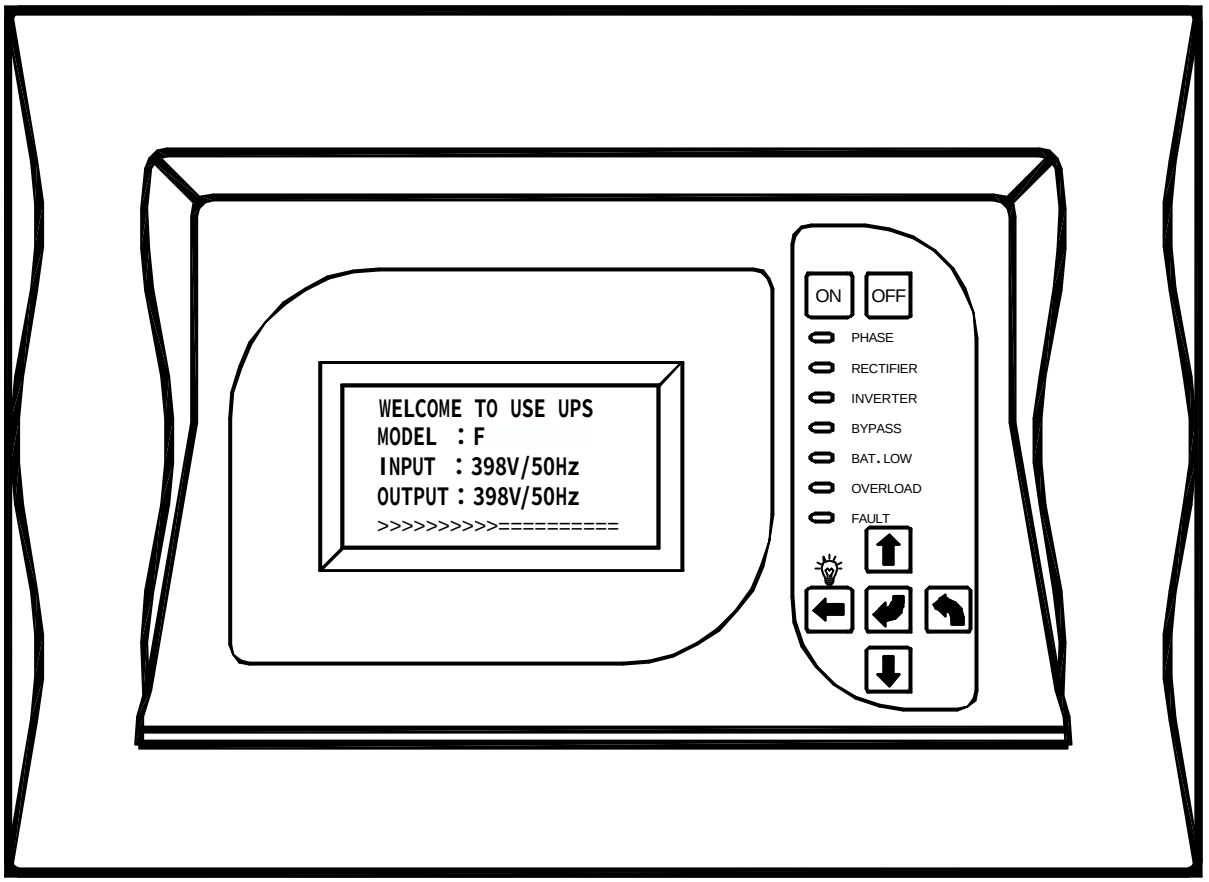


Figure 1-13 display panel structure of three-phase series(10~60KVA) UPS

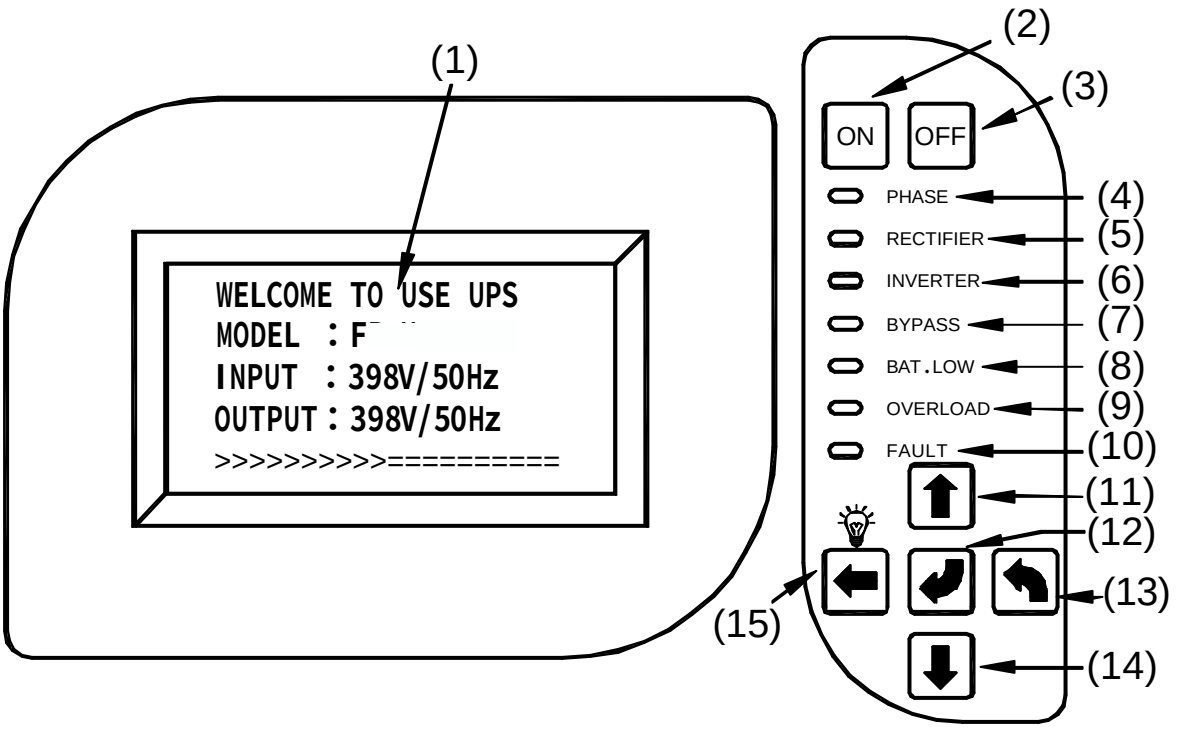


Figure 1-14 display panel interface of three-phase series(10~60KVA) UPS

Explanation：

（1）、LCD display：Show the running parameter and status of UPS（as voltage、current、load etc）.
（2）、on button
（3）、off button
（4）、Phase alarm light（red）：The light will be on when the phase of rectifier input or bypass input is error.
（5）、Work flow light of rectifier（green）：The light will be on when the rectifier is normal.
（6）、Work flow light of inverter（green）：The light will be on when the inverter is normal.
（7）、Bypass alarm light（red）：The light will be on when there is bypass output.
（8）、Battery low alarm light（red）：The light will be on when the battery is low.
（9）、Overload alarm light（red）：The light will be on when the output of UPS is overload.
（10）、Fault alarm light（red）：The light will be on when rectifier、inverter or bypass is error.
（11）、Page up button：Use when lookup display contents of LCD.
（12）、Enter button：Use when lookup display contents of LCD.
（13）、Backup button：Lookup display contents of LCD.
（14）、Page down button：Use when lookup display contents of LCD.
（15）、Page left button：Use when lookup display contents of LCD and turn on LCD screen light.

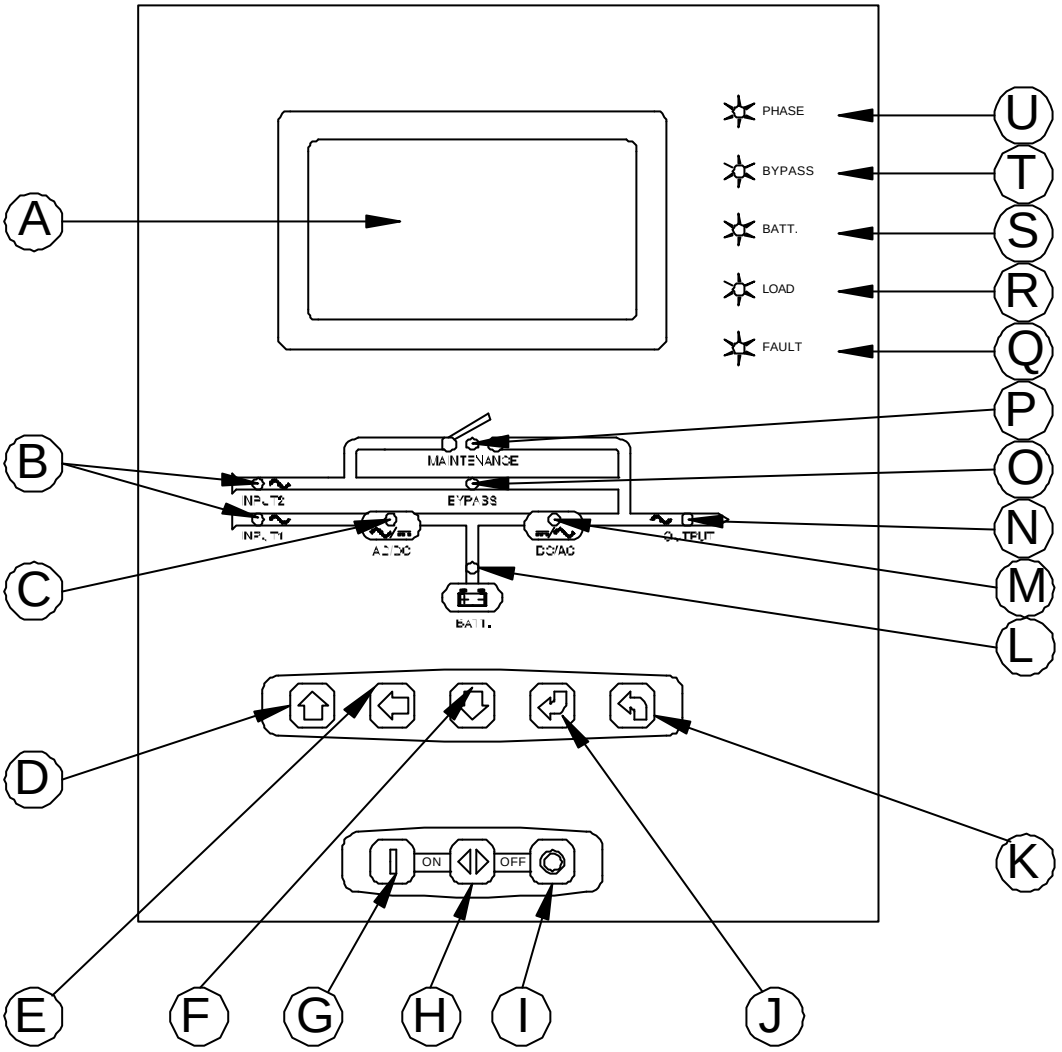


Figure 1-15 Display panel interface of three-phase series(80~160KVA) UPS

A: LCD display: Displaying UPS operation status and parameters (i.e. voltage, current, loading etc).

B: Utility input indicator (Green): Being on at normal utility.

C: Rectifier indicator (Green): Being on at rectifier normal status.

D: Page-up: For looking over LCD displaying contents.

E: Page-left: For looking over LCD displaying contents.

F: Page-down: For looking over LCD displaying contents.

G: On Button: For starting up the UPS with H button.

H: Enter: For starting up the UPS with G button, and shutting down with I button.

I: Off Button: For shutting down the UPS with H button.

J: Enter: For looking over LCD displaying contents.

K: Turn back: For looking over LCD displaying contents.

L: Battery indicator (Green): Being on at battery supplying status.

M: Inverter indicator (Green): Being on at inverter normal status.

N: Output indicator(Green) : Being on at output voltage normal status.

O: Bypass indicator(Green) : Being on at bypass supply status.

P: Bypass maintenance indicator(Green) : Being on at bypass maintaining status.

Q: Fault alarming indicator(Red) : Being on at rectifier, inverter, or bypass fault.

R: Over load alarming indicator (Red): Being on at UPS output over load.

S: Low battery alarming indicator(Red) : Being on at low battery.

T: Bypass alarming indicator(Red) : Being on at bypass output.

U: Phase alarming indicator (Red) : Being on at wrong phase on rectifier input or bypass input.

2. Physical Specification

Table 2-1 Physical Specification

Model / Specification		F 3310	F 3320	F 3330	F 3340	F 3350	F 3360
Input	Commutation	Three phase commutation					
	Voltage (Vac)	398±25%					
	Frequency (Hz)	50±5%					
	Phase	3f 4W+GND					
	Battery voltage (VDC)	12V× 29=348V					
Output	Rated power (KVA)	10	20	30	40	50	60
	Phase	3f 4W					
	Voltage (Vac)	L－N：230 L-L:398					
	Frequency (Hz)	50±0.2%(battery mode)					
	Unbalance three phase voltage stabilization with full load	=2%，compatible 100%unbalance					
	Wave form	Sine wave, THD<3% at linear load					
	Switch time (ms)	0					
	Efficiency	=90%					
	Overload capacity	125% of rated load last for 15 minutes, 150% of rated load last for 1 minute					
Others	Maintenance switch	Maintenance switch with no switch time					
	Start-up	Provided with DC start up function					
	LCD display	Input voltage/ Frequency, Output voltage, Battery voltage, Load, DC current etc.					
	LED display	Operation status					
	Alarm function	Overload, AC input abnormal, Low battery, Failure					
	Communication function	RS232/RS485, dry connection communication signal					
	Battery test function	As showed in 5.3					
	Protect function	Battery low voltage, Overload, Over-temperature, Output short circuit, Output over/low voltage					
	EMC	GB/T 7260.3-2003					
	Noise (dB)	＜65					
	Cooling	Fans					
	Operating Temperature(℃)	0～40					
	Relative Humidity	0～95%，No condensation					
	Dimension (W× D× H)(mm)	500× 800× 1180					
	Weight (Kg)	250	300	320	400	450	460

◆ **Specifications are subject to change without prior notice.**

Table 2-2 Physical Specification

Specification \ Model		F 3380	F 33100	F 33120	F 33160
Input	Commutation	Three phase commutation			
	Voltage (Vac)	398±25%			
	Frequency (Hz)	50±5%			
	Phase	3f 4W+GND			
	Battery voltage (VDC)	12V× 29=348V			
Output	Rated power (KVA)	80	100	120	160
	Phase	3f 4W			
	Voltage (Vac)	L－N：230 L-L:398			
	Frequency (Hz)	50±0.2%(battery mode)			
	Unbalance three phase voltage stabilization with full load	=2%，compatible 100%unbalance			
	Wave form	Sine wave, THD<3% at linear load			
	Switch time (ms)	0			
	Efficiency	=90%			
	Overload capacity	125% of rated load last for 15 minutes, 150% of rated load last for 1 minute			
Others	Maintenance switch	Maintenance switch with no switch time			
	Start-up	Provided with DC s tart up function			
	LCD display	Input voltage/ Frequency, Output voltage, Battery voltage, Load, DC current etc.			
	LED display	Operation status			
	Alarm function	Overload, AC input abnormal, Low battery, Failure			
	Communication function	RS232/RS485, dry connection communication signal			
	Battery test function	As showed in 5.3			
	Protect function	Battery low voltage, Overload, Over-temperature, Output short circuit, Output over/low voltage			
	EMC	GB/T 7260.3-2003			
	Noise (dB)	＜65			
	Cooling	Fans			
	Operating Temperature(℃)	0～40			
	Relative Humidity	0～95%，No condensation			
	Dimension (W× D× H)(mm)	1200× 800× 1600			
	Weight (Kg)	840	950	1180	1300

◆ **Specifications are subject to change without prior notice.**

3. Installation for UPS

One of the main functions of UPS is to supply safe, pure and stable power to load, preventing the power source from disturbing fluctuation or break. Normally the life of UPS is around 5 to 10 years (excludes battery as the validity for battery effected by all kinds of element such as battery type, using way, environment, humidity and installing way etc.). It is very important to select a right installing area and environment for extending UPS's life.

3.1 Selection on location and environment

3.1.1 Location requirement

Location environment should meet the basic situation for equipment normal running.

1) Suitable and effective fire protection equipment should be arranged in machinery room;
2) Machinery room can supply enough AC input voltage and power capacity for equipment normal running requirement. The utility supplying to UPS should be with special breaker.
3) Prohibit any flammable and explosive material stocked in machinery room.
4) Finish the preparing of machinery room and ground wires before installation. The voltage between neutral wire of utility and ground wire in machinery room should be under 5V；
5) The construction work for machinery room should have finished. Ossified ground and dry field without dust are necessary.
6) The position for UPS installation should be closed to AC power possibly
7) Ground can burden UPS weight, 4 pieces 90-degree stator can fix UPS. Fixing UPS on ground with screws to prevent machine remove for earthquake; the feet installing size is as showed in Figure 3-1 and Figure 3-2、Figure 3-3.
8) UPS machinery room should be locked and only appointed person can have the key. The machinery room only allows operator or maintaining person enters. Prohibit other person enter the machinery room.

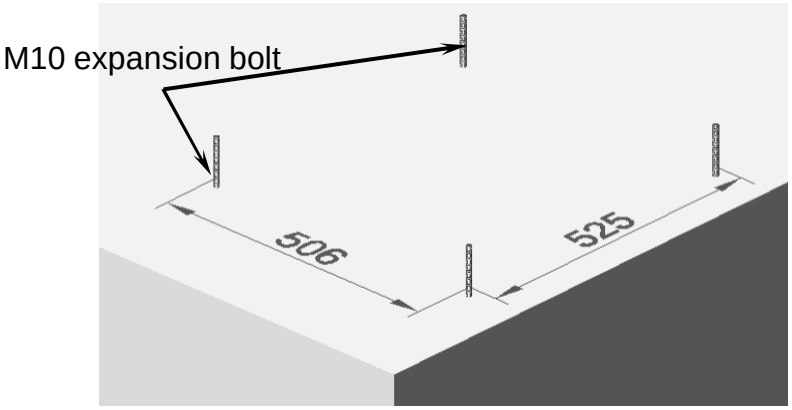


Figure 3-1 Installation of 10-60KVA products of this series

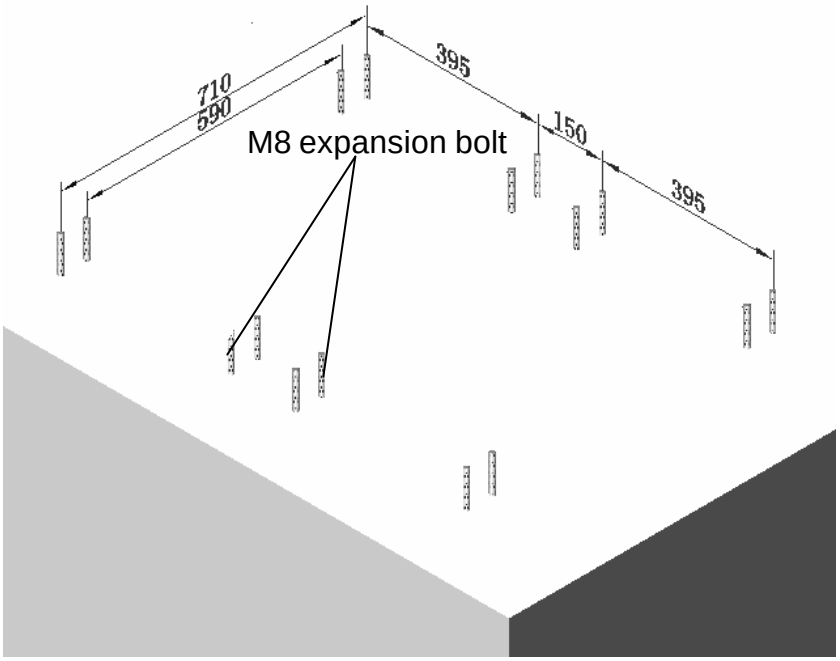


Figure 3-2 Installation of 80~160KVA products of this series

9) UPS machinery room should be locked and only appointed person can have the key. The machinery room only allows operator or maintaining person enters. Prohibit other person enter the machinery room.

3.1.2 Environment Requirement

Environment temperature: 0℃~ +40℃;

Relative humidity: 0%RH~ 95%RH, no condensation;

Cooling: Fan;

Altitude: Meet international standard;

Uprightness: There shall be no shock and the inclination shall no be over 5º;

Pollution grade: Ⅱ;

UPS must be installed in an environment that has enough wind, cool, not high

humidity and clean air. Operation temperature for recommended is 20~25℃, and humidity is about 50%.

The place for UPS should be with well ventilation, there should be some space (at least 1 m) around UPS to facility opening front door and maintaining operation; there should be some space above UPS (at least 1m) for the upper abstraction of heat. Recommend there should be some space for the right and left of UPS to facility UPS daily maintenance.

Prohibit any thing on UPS top to jam the ventilation. And prohibit put UPS in the place with heat source, the machine with slag result or rusty material, gas source.

Attention:

Prohibit any flammable, explosive and aggressive gas or liquor in the room.

Prohibit operating the installation in the environment with metal electric conducting dust.

Please do not deploy UPS under fire protection sprayer

3.1.3 Power Supply Requirement

1) This series requires utility input to be 3 phase 5 lines 398VAC.The capacity of AC utility supply should be larger than UPS maximum input power;
2) There should be special breaker left for UPS in distributing cabinet or screen in machinery room to isolate from utility. And the cabinet and screen shall have better manufactured by professional companies. Input, output breaker and power distributor cabinet cables are commended in 3.3. The input neutral wire can connect to UPS without breaker.

3.2 Unpacking

Take down all UPS package and select installing location carefully (as referred above).

1) Check following fitting/ options all configured:

Keys, user's manual

2) Check the specification of UPS all right:

Check if UPS capacity; input voltage and frequency, output voltage and frequency, phase; battery voltage meet the standard.

3.3 The Selection for UPS Input/Output Cable

Different capacities UPS need different grade cable. Unconformable cable or breaker may lead to the fire risky. Please select the size of breaker and cables connecting with UPS input, output and battery as following. The following only for reference:

1) the choice of breaker

POWER (KVA)	INPUT	MAXIMUM CURRENT (A)	BREAKER (A)
10	230/398V 3F	24	60
20	230/398V 3F	50	60
30	230/398V 3F	73	100
40	230/398V 3F	98	125
50	230/398V 3F	122	150
60	230/398V 3F	147	200
80	230/398V 3F	172	200
100	230/398V 3F	215	250
120	230/398V 3F	251	300
160	230/398V 3F	344	400

2) the choice of the input cable

POWER (KVA)	INPUT	MAXIMUM CURRENT (A)	THE LINE CABLE (mm^2)	THE NEUTRAL CABLE (mm^2)	THE GROUND CABLE (mm^2)
10	230/398V 3F	23	10	10	6
20	230/398V 3F	36	16	16	6
30	230/398V 3F	54	16	16	6
40	230/398V 3F	72	25	25	10
50	230/398V 3F	90	35	35	10
60	230/398V 3F	108	35	50	16
80	230/398V 3F	144	50	70	16
100	230/398V 3F	180	70	95	25
120	230/398V 3F	210	95	95	25
160	230/398V 3F	288	95	95	25

3) the choice of the output cable

POWER (KVA)	OUTPUT	CURRENT (A)	THE LINE CABLE (mm^2)	THE NEUTRAL CABLE (mm^2)	THE GROUND CABLE (mm^2)
10	230/398V 3F	15	6	10	6
20	230/398V 3F	29	10	10	6
30	230/398V 3F	46	16	16	6
40	230/398V 3F	58	25	25	10
50	230/398V 3F	72	35	35	10
60	230/398V 3F	91	35	50	10
80	230/398V 3F	116	50	70	16
100	230/398V 3F	133	70	95	16
120	230/398V 3F	160	95	95	25
160	230/398V 3F	232	95	95	25

4) the DC cable(at the status of 300-410VDC battery voltage)

POWER (KVA)	MAXIMUM CURRENT (A)	CABLE (mm^2)
10	30	16
20	60	25
30	90	35
40	120	50
50	150	50
60	180	70
80	240	70
100	310	95
120	360	95
160	480	95

3.4 the Connection

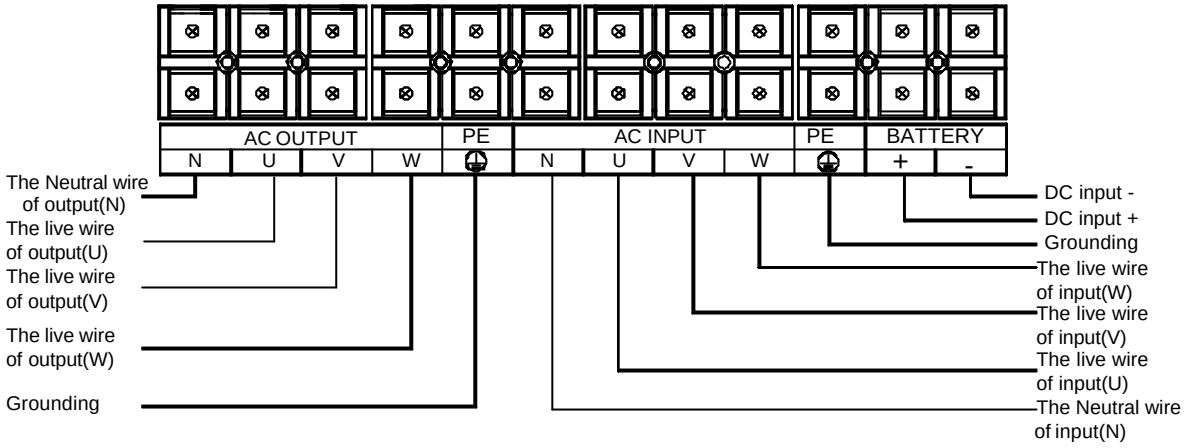


Figure 3-3 the terminal of 10~60KVA products of this series

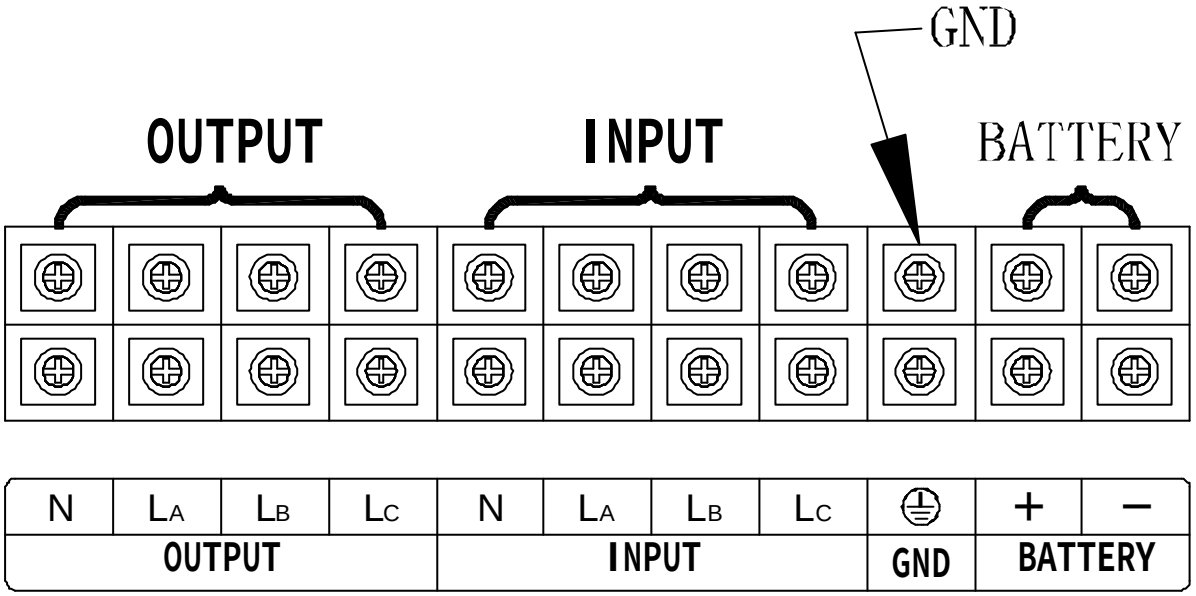


Figure 3-4 the terminal of 80~160KVA products of this series

3.5 UPS Main Unit Installing

Normal machine system complete machine connecting as showed in Figure 3-5:

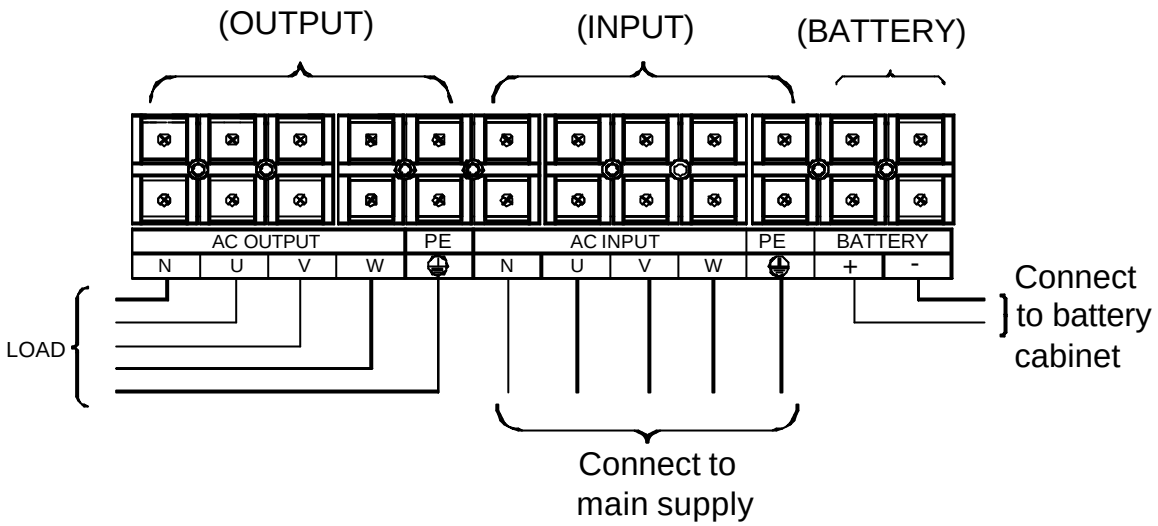


Figure 3-5 the Connection for Single Unit (10~60KVA)

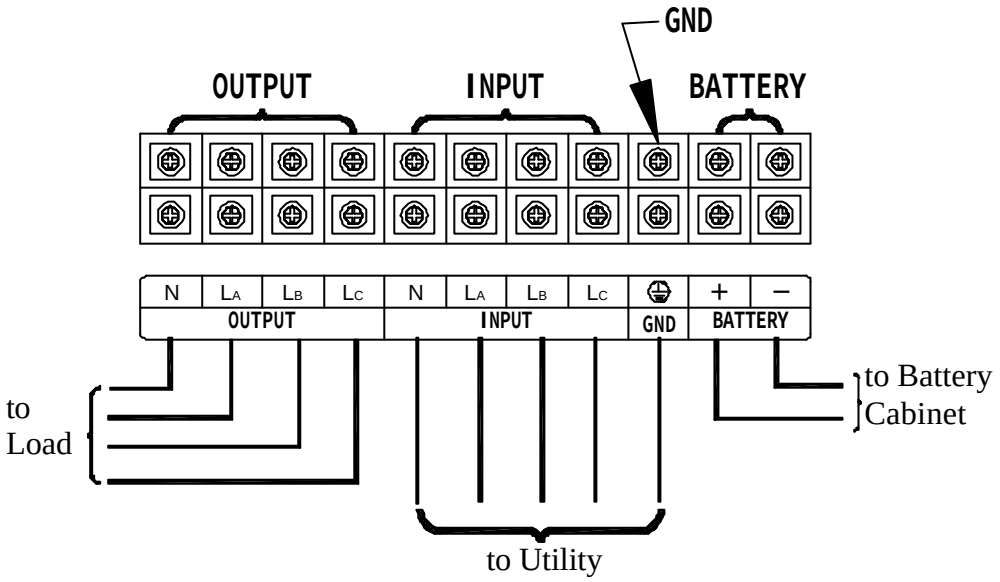


Figure 3-6 the Connection for Single Unit (80~160KVA)

Note: the 3 phase line wire as LA, LB, LC showed in figure above, are corresponding to A phase, B phase, C phase, or R phase, S phase, T phase.

1) Dismantle the breaker cover board in the front of the machine.
2) As showed, connect UPS input, output and battery cables well; pay attention on the polarity of battery, avoiding wrong polarity connecting.
3) Pay attention on right utility input phase order, or machine cannot start up normally and the indicator on panel will light on. If the connection is in wrong phase order, please reconnect in right phase order.
4) Only after assure connection without wrong, startup can be done.

3.6 The Installing of Hot standby System

3.6.1 The Basic Principle

Change the master machine bypass input connection with utility to with slave machine UPS output. It is hot backup in series.

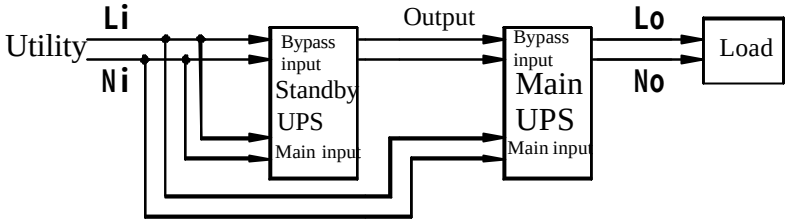


Figure 3-7 Principle Diagram of Hot Standby System

At master machine fault, master machine will switch to bypass automatically. At this moment, slave machine output burden load, and load is still in UPS inverting protection. So equipment runs well as usual. If master machine stays in bypass and the slave machine stay in fault, the utility will burden load.

3.6.2 Work Engineering

While working properly, main UPS supplies power to th load and standby UPS idly runs hot standby system. As show in figure 3-8, thick lines refer to the power passage of hot standby system

Note: 1. the two units of UPS by hot standby connection mode shall not share one battery pack, instead, they shall have separate battery packs

2. The AC input(L_A,L_B,L_C,N when three phase) of main UPS, the bypass input of standby UPS (L,N) and the AC input (L_A,L_B,L_C,N when three phase) of standby UPS should be from the same utility (L_A,L_B,L_C,N when three phase), at the same time, the order of phase must be consistent. When it is three phase the bypass input (L,N) should be connected to utility(L2,N).

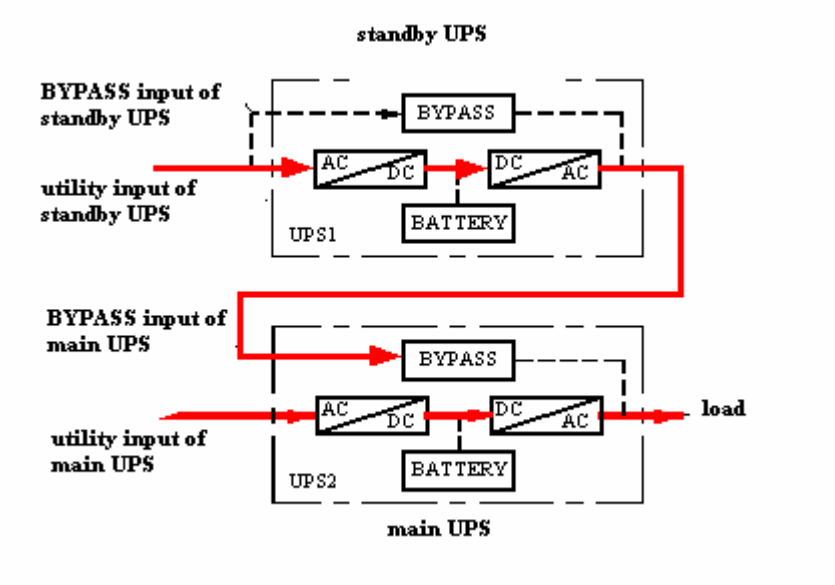


Figure 3-8 Power Flow Chart of UPS Hot Standby in Normal Condition

In case of main UPS failure, the main UPS is switched to bypass status and standby UPS supplies power to the load. As show in figure 3-9, the thick lines refer to the power passage of hot standby system in case of main UPS failure.

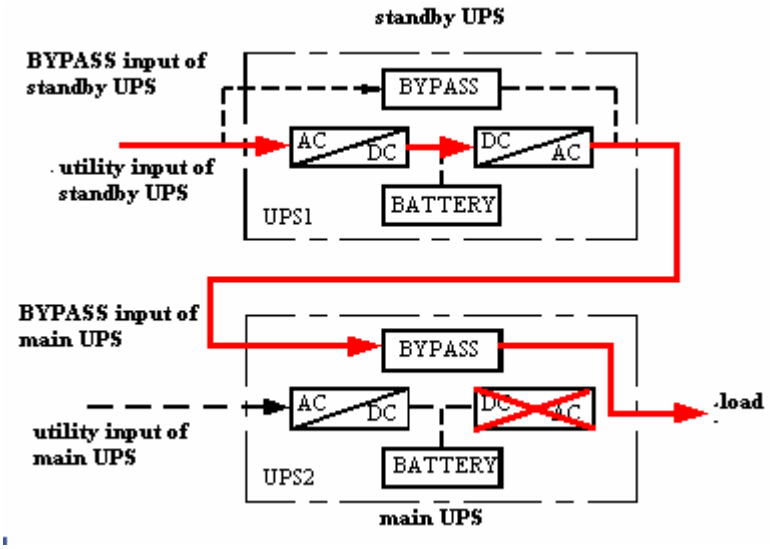


Figure 3-9 Power Flow Chart of Hot Standby System in case of Main UPS Failure

3.6.3 Connecting way

3.6.3.1 Connecting Steps

1) Dismantle the breaker cover board in the front of the machine.
2) Dismantle the short wire connecting between bypass input breaker and utility input breaker of main unit, and dismantle the neutral of input. Connect the 3-phase line

wires of standby unit to the bypass input breaker in order; the output neutral of standby unit to the input neutral of main unit.

3) Connect the utility input of main unit to the utility input of standby unit.

Attention: Utility input phase order should be right, or machine cannot start up normally and the phase order indicator on panel will light on. The wrong phase order connection should be corrected.

4) Other connection is the same as the connection of single unit, as showed in figure 3-10、figure 3-11.

5) Only after assure the right connection, startup can be done.

3.6.3.2 Connecting Way

The connection of the hot standby system is as showed in figure 3-10、figure 3-11:

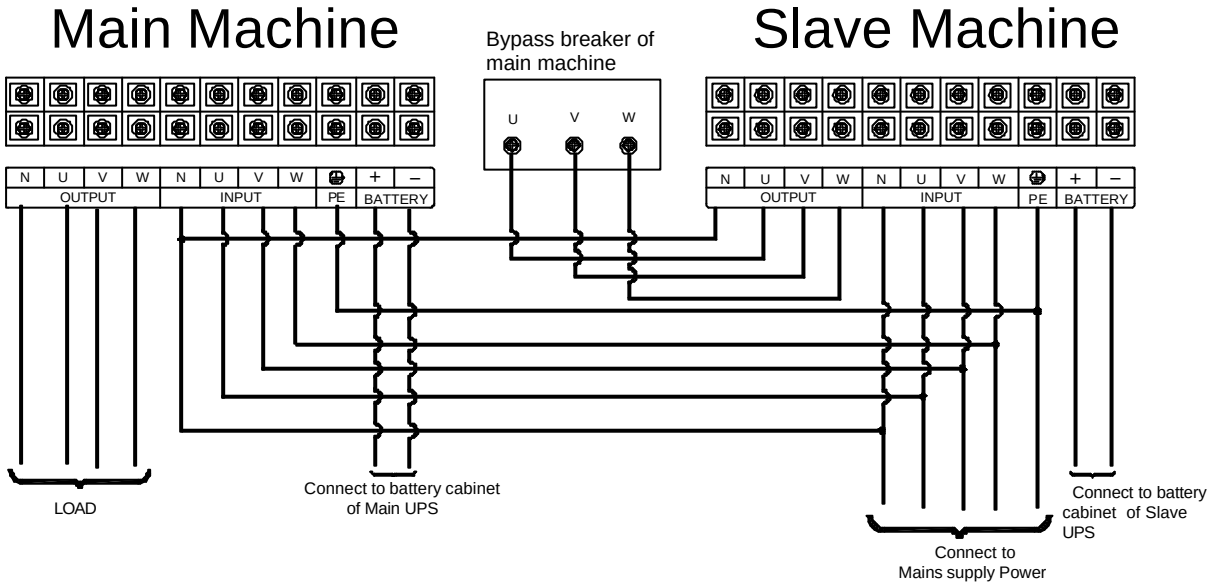


Figure 3-10 Connection of the Hot Standby System(10~60KVA)

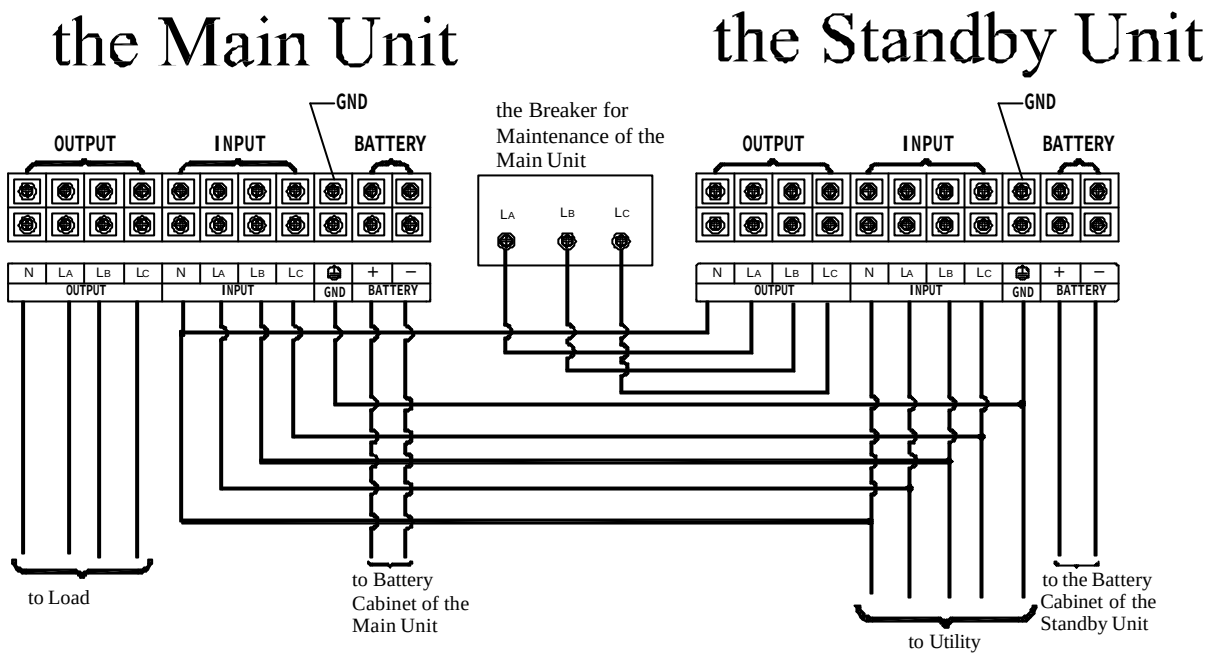


Figure 3-11 Connection of the Hot Standby System(80~160KVA)

Note: the 3 phase line wire as LA, LB, LC showed in figure above, are corresponding to A phase, B phase, C phase, or R phase, S phase, T phase.

3.7 Installing Check

3.7.1 Check on Cabinet

Complete the assembly on cabinet then check the following item for cabinet installing:

1) Steady and elegant ;
2) Uprightness angle less than 5°;
3) Cabinet panel should be on the same horizontal without roughness;
4) Check the tightness of all screws to find whether be lack of washer, spring washer, or fixing in reverse.
5) Check any redundant material left on cabinet. If so, please clean them.
6) Check any scratch, damage or paint-off on cabinet.
7) Check the clean of cabinet, clean dust and dirt.

3.7.2 Check on Electric Connection

After the electric connection, please check the electric connection as following items:

1) Input and power distribution examination: whether AC cable meet standard, the loose of the internal cable in cabinet, full safety mark for AC distributing cell;
2) The examination on connection, series no, line order, polarity for output and battery, stability of cable connection. Recheck the battery connecting polarity and

order.

3) Check the harness to be elegant, the cable banding to meet work art regulation.

4) Make sure the installation, harness whether to be facility the system upgrade, extending and maintenance.

3.8 Installation Steps of Three-Phase Series（for example 10～60KVA）

Remove the UPS from bracket to ground for installation. The following is the installation instruction of Three-Phase Series（10～60KVA）.

1. The external structure of three-phase series（10～60KVA）is as followed after unpacking：

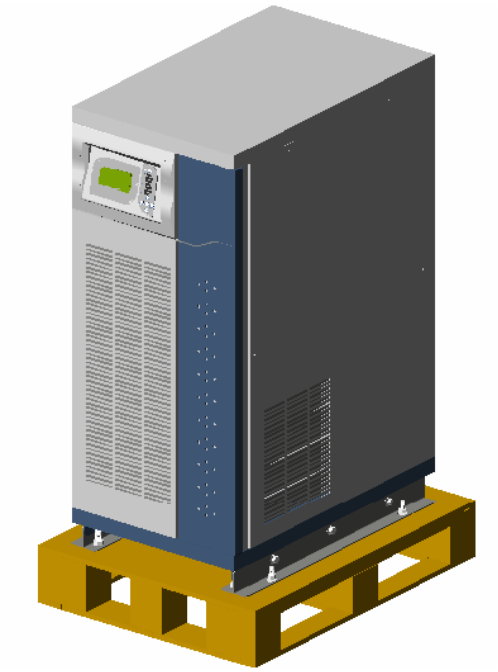


Figure 3-12 Installation Step 1

2. Loose the 4 carrying bolts M16× 65 front and back of mainframe and the 6 hex bolts M12× 40 between horses and mainframe6，make the wheels of mainframe contact with bracket.

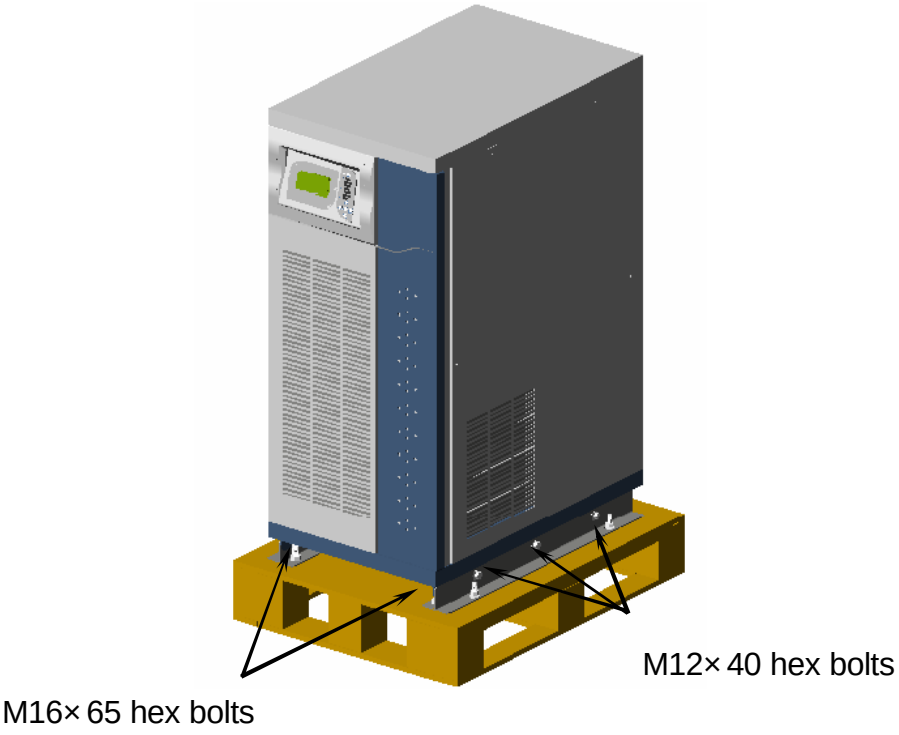


Figure 3-13 Installation Step 2

3. Unlock the loose ground horse and binding hex bolts M12× 40 locked on mainframe，then unlock the binding hex bolts M12× 80 fixed ground horse and bracket，and remove ground horse.

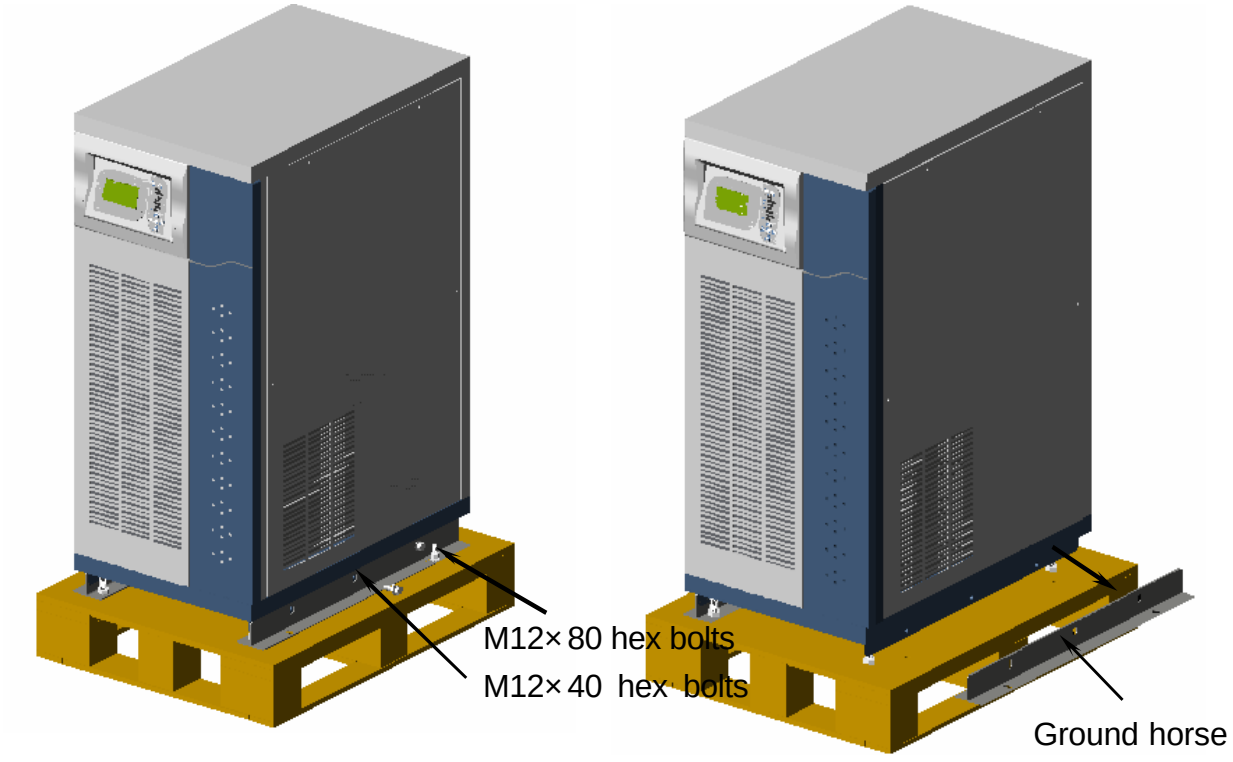


Figure 3-14 Installation Step 3

4. Mainframe is pushed from bracket to ground through inclined bracket.

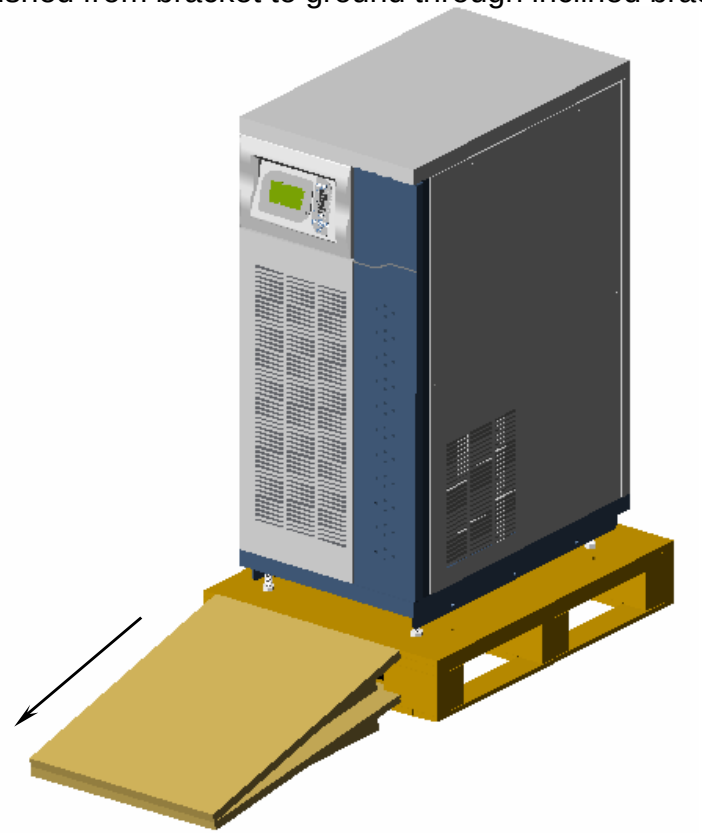


Figure 3-15 Installation Step 4

5. Choose and layout installation site，drive 4 expansion bolt M10 into ground. Require space：506mm× 525mm，the exposed height of expansion bolt should be controlled within 50mm.

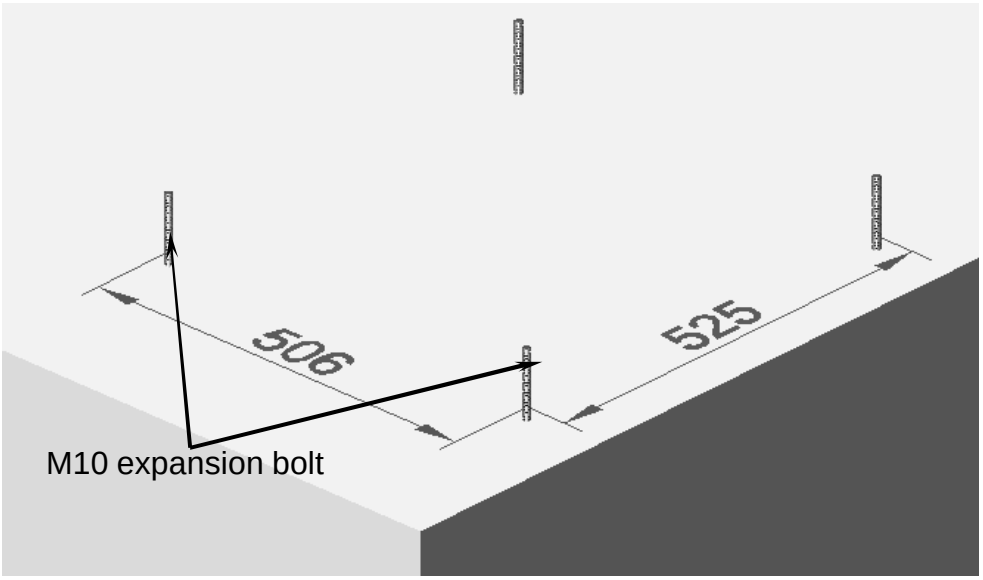


Figure 3-16 Installation Step 5

6. Mount "T" type ground horse，cover gasketF10、spring gasketF10 and nut M10，lock tight.

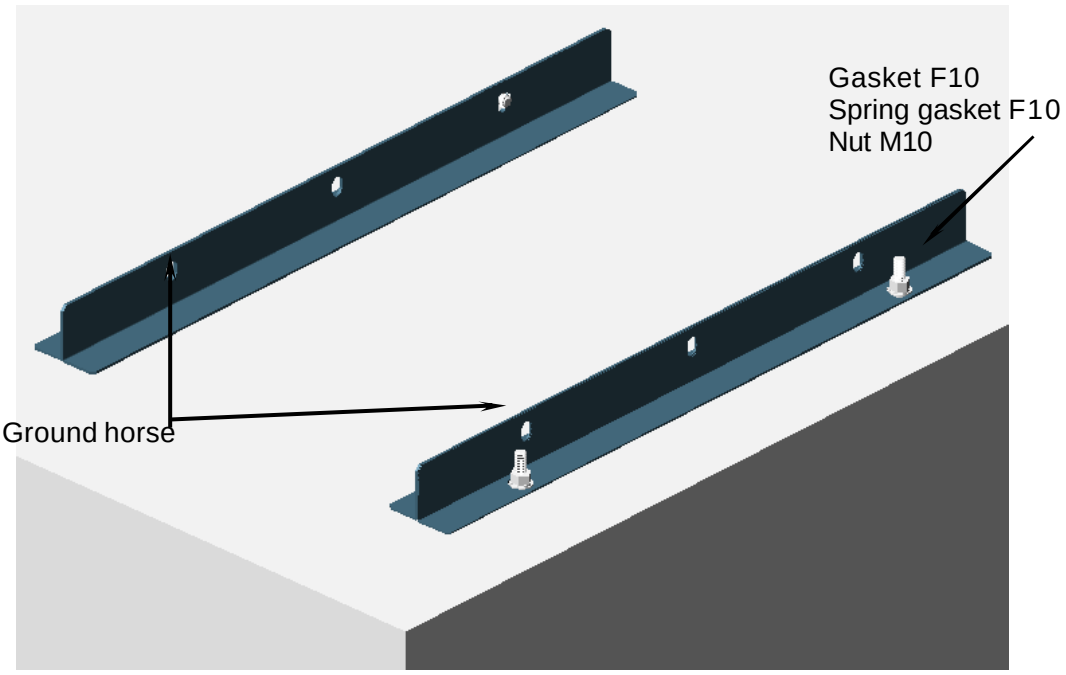


Figure 3-17 Installation Step 6

7. Mainframe is pushed between two-ground horses，re-heighten 4 loose carrying bolts M16×65，lock tight between mainframe and horses with 6 hex bolts M12×40.

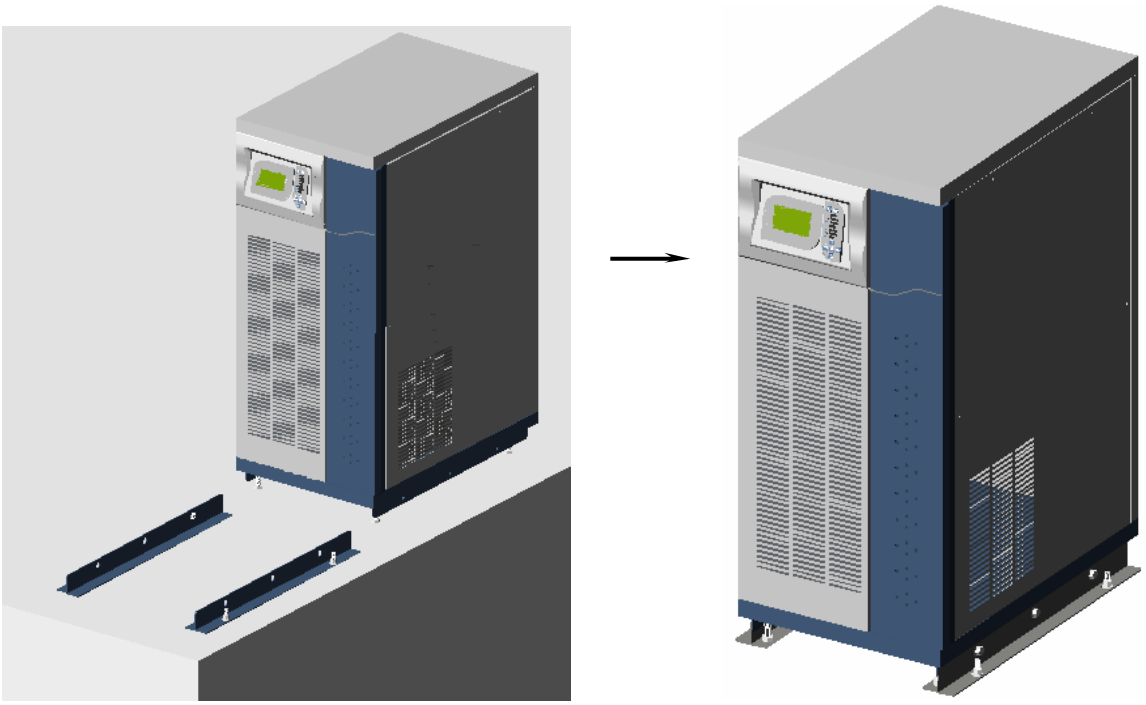


Figure 3-18 Installation Step 7

4. Daily Maintenance

4.1 Before Turning on

Make sure all cables are in right connection and following items all right before startup.

1) If the input voltage is in the rated input voltage range.
2) If input frequency is in the rated input frequency range.
3) If all loads connected to output terminal is switch off.
4) If all breakers and battery is switch off.

Please operate the UPS following the procedure referred follow.

4.2 Bootstrap Procedure

The bootstrap should follow the steps as:

1) **Turn on bypass power breaker（BYPASS）：**

Power board begins to work, LCD on the panel initiate displaying. Then low battery indicator will light on and buzzer will beep continuously.

2) **Turn on rectifier breaker（POWER）：**

Supposing the right input power initiate rectifier automatically, the rectifier indicator (AC/DC) on panel will light on. DC voltage will be established completely after 20s time prolong, and Battery low indicator and buzzer alarming will terminate.

3) **Turn on battery breaker（BATTERY）：**

Turn on battery breaker, rectifier start to charge battery.

4) **Press the inverter button on panel:**

This series UPS start up or shut down operation adapts " double buttons combination operation" to prevent the wrong operating.

At startup, just press

(for 10~60KVA) and (for 80~160KVA) on the panel more than 1 second, DC/AC indicator on will light on, invert output indicator will light on. The equipment will come into normal invert output after 30 seconds. The first-time starting of this series does not allow to output bypass supply, so it is normal for first-time starting without bypass output voltage.

5) Turn on load:

Usually one should wait till the UPS is running smoothly before turning on the loaded equipment, first turning on the higher power equipment, then the lower power

equipment.

4.3 Shut Down

Shut down the UPS following the operation as:

1) **Turn off the inverter：**

Press the buttons

(for 10~60KVA) and (for 80~160KVA) on panel at the same time to turn off inverter. At this moment the static breaker will transfer the power supply for load automatically from inverter to bypass to prevent output voltage break.

2) **Turn off battery breaker（BATTERY）：**

If want to turn off all UPS power, please continue to switch off battery breaker, so rectifier only stock power in DC BUS.

3) **Turn off rectifier input breaker (POWER)：**

Turn off rectifier breaker, the rectifier can not establish DC power from AC utility to DC BUS，DC BUS will discharge power slowly, it will take DC BUS about 2 minutes later.

4) **Turn off bypass input breaker（BYPASS）：**

Before switch off bypass input breaker，you have to assure output load nonuse, or there will be no power output from output terminal to terminate user equipment power at breaking bypass input breaker.

5) **The shut down procedure will be finished after the LCD display and LED indicators light off.**

4.4 Operation Procedure for Maintenance Switch:

Press the buttons on panel

(for 10~60KVA) and (for 80~160KVA) at the same time to turn off inverter.

1) Turn off rectifier breaker (POWER) and battery breaker (BATTERY) after the bypass indicator on panel lights on.

2) Position maintenance switch/ maintenance breaker to "BYPASS"/"ON" position, turn off bypass power breaker (BYPASS) after bypass maintenance indicator (BYPASS) on panel lights on. Open the panel to switch main board SW1-3 shift switch to ON (or take out the connection for main control board CN14). After all indicators on panel light off, switch main board SW1-3 shift switch to OFF (or resume the connection for main board CN14); then it can be maintained.
3) After the maintenance finished, turn on bypass power breaker (BYPASS). Switch maintenance switch to "UPS"/ "ON" position after the bypass indicator on panel (BYPASS) lights on; bypass power output for UPS is initiating.
4) Then begin to do the operation as the 4th daily operating procedure.

5. The Operation Procedure of the LCD Display

The LCD display can display all running status and parameters of UPS. User can preset some UPS parameters and control UPS by operating interface. Full LCD screen can display 5 lines of characters. More characters can be displayed by turning up/down pages rolling. Elegant and simple operation buttons facility user operating.

5.1 the Buttons

There are 5 buttons for this series whose function is as showed following:

This button means "upward roll / parameter setting +" used for upward rolling at multi-lines of characters displaying / adding parameter value at Parameter setting.

This button means "downward roll / parameter setting—" used for downward rolling at multi-lines of characters displaying / decreasing parameter value at Parameter setting.

This button means "parameter setting" used for selecting switch when many options in the same display page.

This button means "enter" used for confirming the selected option with mark">"or set parameter confirm.

This button means " turn back to upper page"used for turning back to upper menu or direct come back without parameter input.

5.2 Startup/Shut-down Operation

This Series UPS On/Off keys for 10~60KVA.: .

Power on: Push

key about 1S

Power off: Push

key about 1S.

This series UPS start up or shut down operation adapts " double buttons combination operation" to prevent the wrong operating for 80~160KVA.

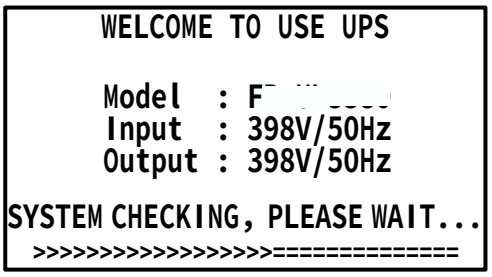
They position on the panel as:

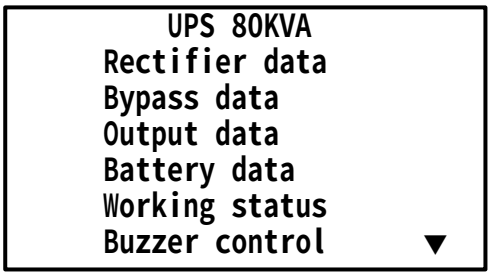
Startup ---- press for more than 1 second.

Shut down ---- press for more than 1 second.

5.3 Displaying Contents and Related Operation(for example 80KVA)

1) Shut off UPS bypass breaker.


WELCOME TO USE UPS
Model : F
Input : 398V/50Hz
Output : 398V/50Hz
SYSTEM CHECKING, PLEASE WAIT...
>>>



There are other menu options as following:

BATTERY TEST

LANGUAGE

DATE&TIME SETTING

MANUFACTURER INFO

HISTORICAL EVENT

Press to position mark ">" at selected option in menu.

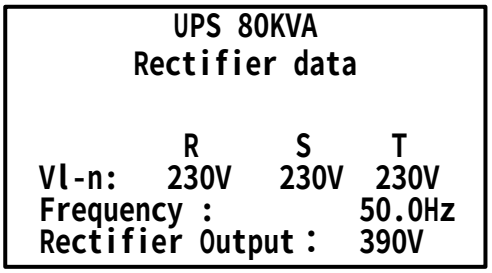
The mark at right up and right down means there are still some contents in screen can be displayed by up or down rolling page.

Press button into the option with">" mark.

Press button back to normal output parameter normal page.

4) Rectifier parameter page:

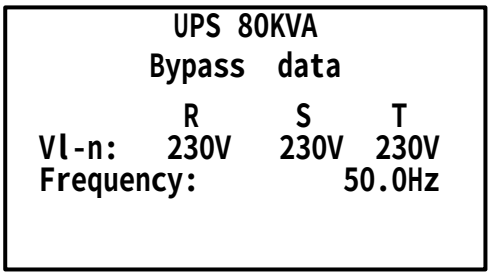
This page displays 3 phase input voltage, frequency of UPS rectifier and rectifier DC output voltage.



Press button back to upper menu index, other buttons are negative.

5) Bypass parameter page:

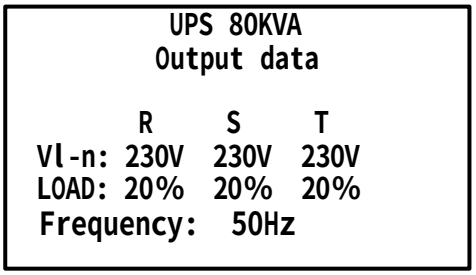
This page display UPS bypass 3 phase voltage and frequency.



Press button back to upper menu index, other buttons are negative.

6) **Output parameter page:**

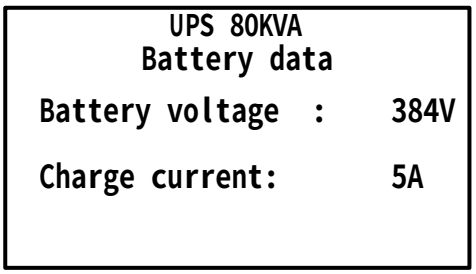
This page displays UPS three phases output voltage and load percentage for each phase.



Press button back to upper menu index. Other buttons are negative.

7) Battery parameter page:

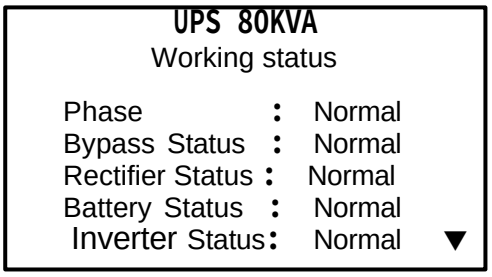
This page contains UPS battery voltage and charging (discharging) current. It will display charging current at UPS rectifier normal status; display discharging current at UPS inverting status.



Press button back to upper menu index, other buttons are negative.

8) Running status page:

This page contains all UPS work status.



There are other two lines marked at right down of screen.

OUTPUT: NORMAL

LOAD STATUS: NORMAL

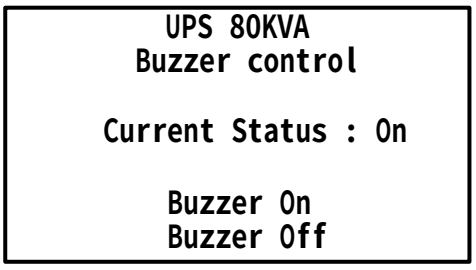
TEMPERATURE: 26(C)

Press buttons to do rolling browse.

Press button back to upper menu index. Other buttons are negative.

9) Buzzer mute control page:

This series UPS supply UPS mute control. User can shut down buzzer intermission beeping alarm when UPS stay in inverting without input utility. Buzzer will initiate alarming automatically and be out of control from the shield at UPS abnormal status.



Press buttons to select the options for On/Off.

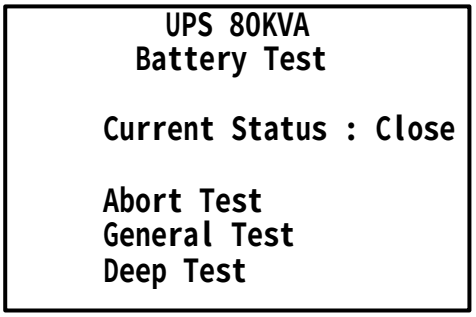
Press button to confirm the selected status.

Press button back to upper menu index. Other buttons are negative.

10) Battery test control page:

This series UPS supply battery test function, the principle is to discharge UPS battery in a short time to test battery validity by lowering DC output voltage under long time

utility input status.

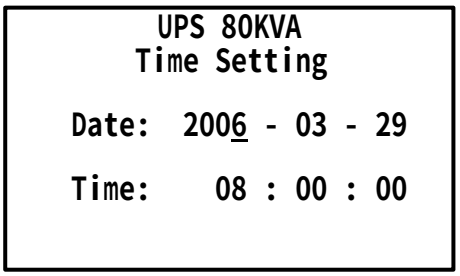


Press button to confirm the selected status.

Press button to back to upper menu index. Other buttons are negative.

11) UPS internal time adjusting:

This series UPS with internal timer chip can displays present time. User can adjust time by this page.



Press button to move the mark among the position of year, month, date, hour, minute, second.

Press button to add or reduce time parameter.

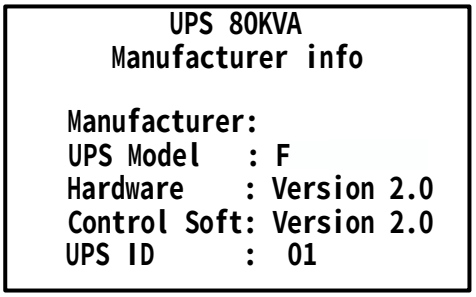
Press button to confirm the adjusted time meter and input UPS internal timer chip.

Press button to back to upper menu index.

12) Manufacturer:

This page display UPS manufacturer information, mode name, version and equipment I D address No.

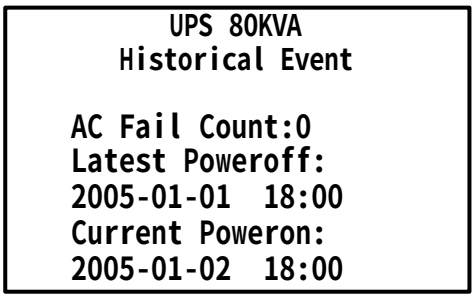
I D address NO supply address coding information to communication data port at UPS taking RS485 multi-machines supervising. It can be set with a series codes in UPS. So we recommend not to change this meter normally.



Press button back to upper menu index. Other buttons are negative.

13) History record page:

This page supplies some important history parameter, the time for it and related display of UPS. They are the basic reference data for analysis on local network and abnormal situation.



Press buttons to do rolling browse

Press button back to upper menu index. Other buttons are negative.

Press + buttons more than 10 seconds to clean the history record in UPS memory to facility the fault analysis for maintenance . So it is recommended not to clean history data frequently.

6. The Connection for Communication Port

6.1 RS232 Communication

There is a RS232 communication port on panel display control board. It is optional for UPS supervising software, SNMP card, supporting close communication for UPS（ generally no more than 10M）； Realizing the remote control on UPS input voltage, frequency, and output voltage, frequency, loading etc parameters. The remote on/off machine is allowed.

6.2 RS485 Communication

There is a RS485 communication port on panel display control board, it can support remote communication. Realizing the remote control on UPS input voltage, frequency, output voltage, frequency, loading etc parameters. The remote on/off machine is allowed.

6.3 Dry connection communication

There are two dry connection communication ports on the panel display control board. They are for low battery and utility fault； they are close for low battery , utility fault.

7. The selection and maintenance for options

7.1 the Application of Battery

7.1.1 Charging /Discharging for battery.

Battery bank is an important apparatus to assure the uninterrupted power supply for UPS. Battery bank connects with the battery branch circuit of UPS system. Power system will do float charging or balance charging on battery bank at utility normal status; the battery supply user equipment by inverting at utility fault.

7.1.2 the Selection of Battery

1) The selection of battery bank capacity. It depends on two factors of the needed current for load equipment in power system and the respected battery discharging time. Supposing discharging current of the battery bank in power system is 80A, the respected battery bank power supply time at AC break is 10h. So the system require battery capacity= battery discharging current× The power supplying time at AC break=800Ah, there is an added redundancy on the theory battery capacity . That is the practical capacity of battery. The principle of battery selection should be a certain higher capacity than theory capacity. The redundant value should be in 20% of capacity of load.

2) Prohibit different capacity batteries be used in series and different voltage battery be used in parallel mode.

Please do not connect different capacity battery bank in parallel mode(the different battery internal resistance will affect charging current procedure to lead different capacity battery without full charging. That will result in two different battery bank: one gets over charge , another one gets low charging; And there will be battery bank mutual discharge at discharging procedure) .

7.1.3 the Notice Project for Battery Use , Maintaining

1) Muti-banks of battery in parallel mode, the total capacity of battery bank equals to the sum of all batteries capacity.

2) The using environment temperature is in 0℃~40℃, the validity of battery and battery temperature are in inverse proportion, so there should arrange abstraction of heat on the design for high temperature battery application to prevent the sharp increasing of battery temperature. (When battery bank under increasing temperature, the polarity board will be corrupted badly by vitriol. That will shorten validity of battery.) If it is possible, please fix air conditioning in machinery room to prolong battery validity.

3) After completion of power system fixing, charge the first used battery or longtime unused battery before their application; Battery will loss the capacity in stock slowly for longtime self discharging. Without full charging, the battery can not reach accordant performance.

Check all parts of battery and fasten status connection once to prevent accident after a certain period. Tightening work is also necessary.

7.2 SNMP Card and Software

SNMP card will be fixed in UPS internal SNMP card slot or outlay to realizing network remote management on UPS. Hot change design realizes fast and facility direct change and maintenance. User can supervise UPS by IE etc browser UPS. Operating illustration follow the user manual of net adapter.

7.3 UPS Concentrated Monitor

Background monitoring software-concentrating monitor can realize the background supervising over UPS and remote On/Off machine. Operation illustration follow concentrating monitor user manual.

8. Maintenance

8.1 Machinery management

The management of machinery room includes environment and safety management, equipment management.

1) Basic target for environment safety management: Make sure environment temperature, related humidity, brilliance, Static disturbing, noise, Strong EMC disturbing to meet standard requirement to assure the stability , reliability , security of power equipment. All for the normal power supplying for load equipment.

2) Basic demand on equipment management: ensure the machinery performance of equipment well, the electric performance of equipment meet the standard, reliability and stability of equipment, and intactness of equipment related technical reference and original record.

8.2 Maintenance Instructions

Correct maintenance, including preventive and remedy maintenance, is key to optimal operation of UPS and will prolong the equipment's life span. Preventive maintenance includes some frequently executed procedures which are for the prevention of system faults and maximization of system efficiency; remedy maintenance includes trouble-shooting of the system for effective maintenance.

8.2.1 Safety Precautions

In order to carry out system maintenance safely and successfully, the relevant safety precautions must be carried out, essential tools and testing equipment shall be used and qualified maintenance staff shall participate. The following safe operation procedures shall be observed at any time:

1. Bear in mind that there is dangerous voltage in UPS even if it is not running.
2. Make sure that the operation and maintenance staff of UPS is familiar with the equipment and this manual.
3. Do not wear gold or silver ornaments like rings and watches, etc during operation of UPS.

4. Do not take for granted the safe operation procedures. If you have any questions, please consult those who are familiar with the equipment.

5. Look out for the dangerous voltage in UPS. Before maintenance and adjustment, use a voltage meter to ensure that the power supply is switched off and it is safe for operation.

8.2.2 Regular Preventive Maintenance

The following are the steps of preventive maintenance which, after execution, will increase the efficiency and reliability of UPS system.

1. Maintain a clean environment to avoid dust or chemical pollution to the UPS.

2. Wiring

   Check once half a year if the input and output terminals have good contact.

3. Check regularly the operation of draught fans to prevent choking of draught. They shall be replaced in case of damage.

4. Check regularly battery voltage and UPS working status.

Following are simple settlement on fault. The fault should be under the control from products agent, eligible and professional engineer or technician of factory. Normally please avoid taking apart at will to prevent the risky of electric shock.

Abnormal phenomena	Fault diagnosing and checking appoints	Settlement
(1)AC/Dc indicator off, FAULT indicator on.	Rectifier utility input breaker close, the front panel INPUT indicator, AC/Dc light off, FAULT light on.	Open rectifier utility input breaker.
	The rectifier input voltage abnormal, AC/DC light off, FAULT light on.	Connecting the normal voltage for rectifier.
(2)Panel phase order light on, buzzer alarming.	Fault phase for AC input, LCD display the wrong message, the front panel phase light on(PHASE) . Buzzer alarming.	Change the phase order of rectifier utility input lines, normally exchange two phases of LA? LB? LC phase.

(3)Inverter output does not work, buzzer alarm.	Rectifier does not start up. Buzzer long alarms and low battery light on.	After the completion of the rectifier slow startup, the buzzer alarming will be terminated.
	Shows output over load. The front panel OVERLOAD light on.	Reduce UPS power load.
(4)UPS paralyzing and supplying 0 output at utility fault.	Battery breaker close.	Switch on battery breaker
(5) LCD or LED off	All UPS breakers stay in close.	Open one breaker on UPS front panel.
	Power board fault	Charged by professional maintaining technician.
(6) Fan stop rotating	Abnormal LB phase output voltage, fans fault	Charged by professional maintaining technician.
(7)Panel FAULT light on, buzzer long alarming	Short circuit at output terminal (including load short circuit).	Remove short circuit point, shut down UPS inverter, restart inverter.
	Over temperature of inverter heat sink.	Reduce load, or balance the loads;
	The fuse on inverter fused, or IGBT module abnormal	Change fuse or IGBT module
	Input utility fault, battery in low battery protection for discharging.	Restart at utility resume.
(8) Panel OVERLOAD light on	UPS output overload.	Reduce load.
(9) UPS can not switch inverting supply to bypass supply at off machine.	Make sure whether bypass power input voltage and frequency normal.	Check bypass power voltage, frequency.
	Fault on bypass/invert SCR driving board	Charged by professional maintaining technician.

(10) UPS can not switch from bypass power supplying to invert power supplying at bootstrap.	Inverter fault.	Charged by professional maintaining technician.
	Fault on bypass/invert SCR driving board.	Charged by professional maintaining technician.
(11)Abnormal communication.	Wrong connection of communication cable	Reconnect with right port.
	Communication Software not installed unsuccessfully.	Install software correctly
	Wrong setting for PC communication interface.	Correct communication port set.
	Excludes above problem, still have no normal communication.	Charged by professional maintaining technician.

9. Package, Transportation and storage

9.1 Package

The main unit of this UPS is firstly packaged in carton, and then in wooden case for more protective. There are some signs on the carton, such as model, volume, date etc.

9.2 Transportation

It should strictly conform to the care signs during transportation, and place the UPS according to the care signs, to avoid the shake to the UPS. It can't put the equipment on the open vehicle and cabin, and should be put together with flammable articles. It is prohibited to put the equipment in the open air in the midway, and should avoid the drench of the rain, snow or other wet goods, also machinery damage.

9.3 Storage

Place the equipment according to the care signs. It should part from ground for 20cm, part from wall, hot source, cold source, windows or air entrance for 50cm.

Environment temperature for storage is 0~ 40℃, relative humidity is 20%~ 80%, the stock should not have any baleful gas, flammable and corrosive chemistry, have not strong shake, strike and magnetic field. The storage period in this condition is for six months, over six months, the equipment should be checked, and charged the battery every three months.